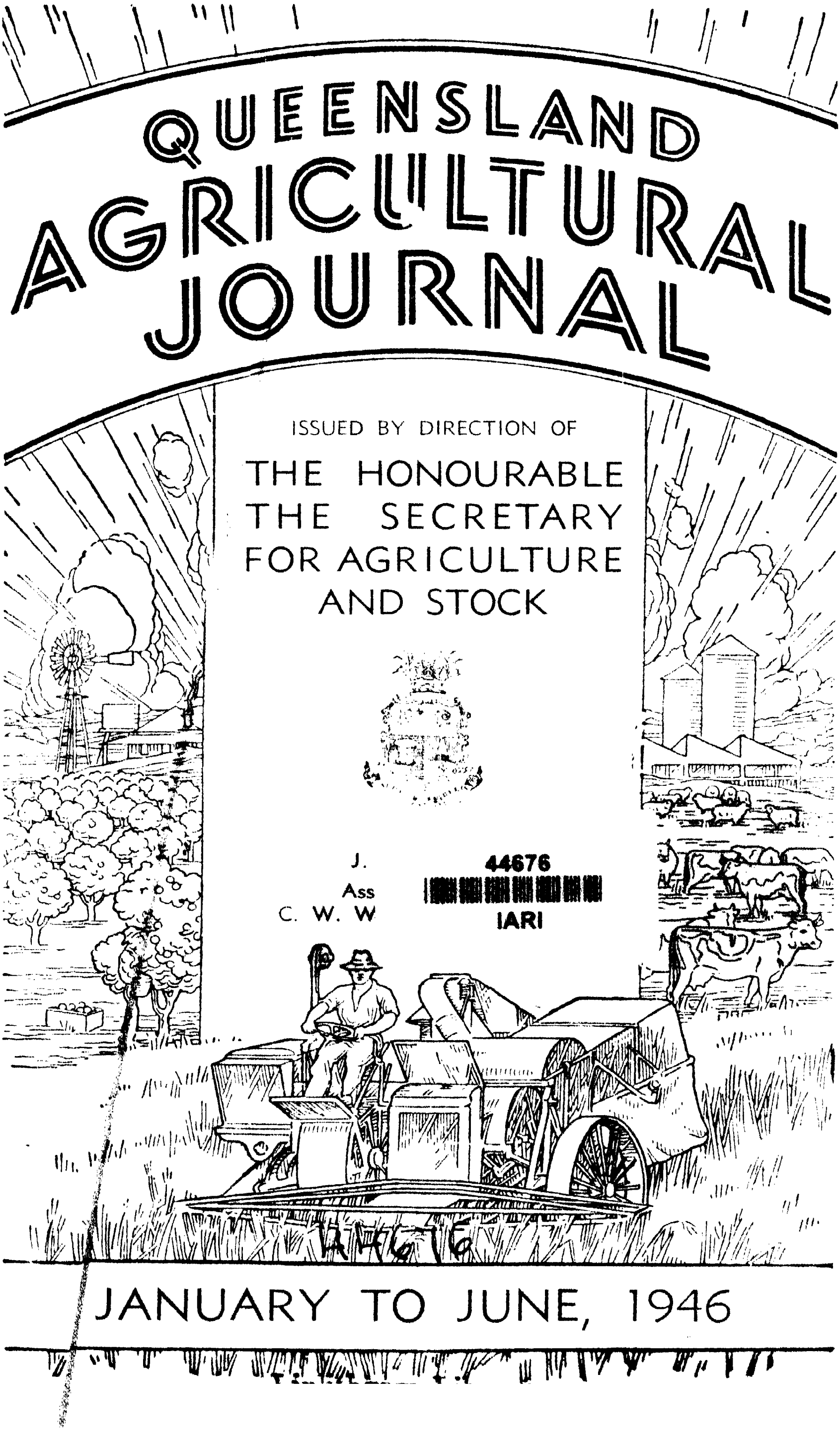
सत्यमेव जयते

INDIAN AGRICULTURAL
RESEARCH INSTITUTE, NEW DELHI

I. A. R. I. 6.
MGIPC—S1—6 AR/54—7-7-54—10,000.

Supplement to the "Queensland Agricultural Journal," September, 1946.

Volume 62



QUEENSLAND AGRICULTURAL JOURNAL

ISSUED BY DIRECTION OF
THE HONOURABLE
THE SECRETARY
FOR AGRICULTURE
AND STOCK

J.
Ass
C. W. W
44676
IARI
44676

JANUARY TO JUNE, 1946

Vol. 62 Parts 1 to 6

QUEENSLAND AGRICULTURAL JOURNAL

GENERAL INDEX.

PAGE.

A

Acre Measurements 235
Agricultural Research in Queensland 3
Air Transport of Food 248
American Farming 57
Anchor Bolts in Concrete 58
Annual Hibiscus 233
Apple Deficiency Disorders 215-28
Astronomical Data 61-2, 126-7, 190-1, 254-5, 318-9, 382-3
Australian Agricultural Council 131-2

B

Bagging Needles 378
Barbed Wire Roller 58
Barley for Poultry 180
Barrier Saltbush 273
Blackleg of Sheep 15-6
Bladder Ketmia 233
Book Reviews—
  Now Blame the Farmer 296
  Food or Famine 377
Bottle Tree Caustic 376
British Agriculture 184, 313
Bumper Bar Buffer 314
Bureau of Sugar Experiment Stations Report 184
Butter—
  Concentrate 247
  Quality 122
  Statistics 17-27
Buttermaking Control 151-6

C

Cabinet for Papers 186
Cane Grass 273
Cape Cotton 233
Cattle—
  Age-telling 314
  Feeding on Oats 182
  Warts 308-9
  Worms 371-5
Caustic Creeper Poisoning 240

PAGE.

Cheese Quality 92-7
Child Welfare 121, 187-8, 250-1, 315-6, 379
Citrus—
  Expansion 131-2
  Maturity Standards 312
  Propagation 7-9
Cobbler's Peg 273
Colics in Horse 304-8
Collins, Hon. H. H. 197
Concrete Mixer 249
Cotton Bush 273
Cotton Varieties 325-7
Cow Rugs 378
Cream—
  Butterfat Content 354-6
  Cooling Tower 279-89
Cucurbit Pests 137-50

D

Dairy Herd Management 29[illegible], 323-4, 377
Dairy Utensil Cleaning 156-7
Damson 273
Decentralization 270
Deciduous Fruit Disorders 215-28
Department's Aid to Farmers 259-60
Duck raising 360-70

E

Eggs—
  Candler 186
  Quality 241-6
Electricity on Farms 115
Event and Comment—
  Extension of Agricultural Research 3
  The Case for Queensland Wheat 67
  Fodder Conservation 68
  The Call for Increased Production 131
  Expansion of Citriculture 131
  Soy Bean Production 132
  Tobacco-growing 132
  Farm Mechanisation 132
  The Right Use of Land 195
  The Department and the Farmer 259
  New Poultry Legislation 260

PAGE.

Event and Comment—*continued.*
  Feeding and Breeding for Dairy Production 323
  Water Supply Investigations 324

F

Farm Mechanisation Schemes 132
Fauna Protection 312
Feeding—
  Oats to Pigs 101-5, 183
  Oats to Poultry 97
  Oats to Stock 181-2
  Pigs 101-5
  Poultry 97, 174-80
Feed Mixer 123
Fodder Conservation 68
Food and Agriculture Organisation 248
Fork Rack 123
Fruit Spotting Bug 229-33
Fuchsia Bush 273

G

Gallweed 273
Gambia Pea 233
Goat Feeding 182
Grapes—
  Boron Deficiency 74-8, 225-6
  Hen-and-chickens 74-8, 225-6

H

Hatcheries Registered 116-7
Hen-and-chickens of Grapes 74-8, 225-6
Horses—
  Age-telling 157
  Colics 304-8
  Feeding on Oats 181

I

Irrigation Development 324

J

Johnson Grass 273
Junior Farmers' Movement 121-2, 246

K

Kairi Regional Experiment Station 376
Kitchen Recipes [illegible], 125, 188-9, 251, 316, 380

L

Lice on Pigs 48-51
Lucerne Pests 79-89

M

Mango Pests 10-14
Marketing—
  Pigs 295-6
  Poultry 52-3
Measurement of an Acre 235
Milk—
  Cooling Tower 279-89
  Pasteurisation Plant 55
  Production Recording 28, 158-9, 236-7, 292-3, 357-9

PAGE.

Milk—*continued.*
  Quality for Cheese 92-7
  Spoilage by Can 234-5
  Tube Inspection 356
Minister's Message 4
Mites on Pigs 49-51

O

Oats—
  For Feed 181-2
  For Pigs 183
  For Poultry 97

P

Papaw—
  Culture 202-14
  Fruit Spotting Bug 229-33
Peanut—
  Board 312
  Pests 345-53
Pigs—
  Correspondence Course 376
  Ear Notching 111-5
  Feeding on Oats 181, 183
  Identification 160-73
  Management 98-111, 313
  Marketing 55, 247, 295-6
  Parasitic Diseases 30-51
  Trough Handles 123
Pineapple Water Blister 278
***Pine Bark Weevil* Review** 311
Plumwood 273
Poison Plants—
  Bottle Tree Caustic 376
  Caustic Creeper 240
  Deadly Nightshade 273
  Fuchsia Bush 273
  Johnson Grass 273
  Strychnine bush 273
  Yellow-wood 273
Poultry—
  Feeding 97, 174-80
  Flocks on General Farms 297-9
  Industry Act 260
  Transport 52-3

Q

Queensland Dairymen's Organisation 55, 247

R

Ragweed 233
Rationing of Feedstuffs 119, 312
Riding Rules 122
Rivet Cutting 249

S

Sack Opener 186
Saltbush, Barrier 273
Scale Insects 10-12
Scientific Aid to Farming 16-17
Sesbania Pea 273
Sheep—
  Barber's Pole Worm 238-9
  Blackleg 15-16
  Feeding of Oats 181
  Gas Gangrene 90-1

PAGE.

Sheep—*continued.*
  - **Malignant Oedema** 90-1
  - **Nodule Worm Disease** 301-4
  - **Swelled Head** 15-16, 90-1, 238-40
  - **White Oedema** 90-1
  - **Yellow Big Head** 240

Show Dates 118, 136, 228, 291
Soil Conservation 69-73
Soybean Investigations 132
Staff Changes and Appointments 55, 119, 120, 183, 247, 312, 376
St. Barnaby's Thistle 271-2
Strychnine Bush 273
Sugar—
  - **Production Figures** 120
  - **Technologist's Conference** 195

Swelled Head of Sheep 15-16, 90-1, 238-40

T

Tobacco—
  - **Bulking** 199
  - **Conditioning** 198-9
  - **Flue-curing** 133-6
  - **Grading** 199-201
  - **Industry** 132

Tomato—
  - **"Buck" Plants** 343-4
  - **Cultivation** 343
  - **Disease Control** 274-7
  - **Fertilizers** 261-70
  - **Irrigation** 340-3
  - **Planting Systems** 330-40
  - **Seed Selection** 344
  - **Soil Preparation** 328
  - **Soils** 261-70
  - **Transplanting** 329-30
  - **Turnip Weed** 5-6
  - **Twine Feeder** 58

PAGE.

V

Vegetable Group Committee 120
Veterinary Science Scholarships 247

W

Warts on Cattle 308-9
Water Blister 273
Water for Stock 310-11
Weather Data 62-4, 127-8, 192, 252-3, 256, 317, 320, 381, 384
Weeds—
  - **Annual Hibiscus** 233
  - **Bladder Ketmia** 233
  - **Cobbler's Peg** 273
  - **Cape Cotton** 233
  - **Deadly Nightshade** 273
  - **Johnson Grass** 273
  - **Perennial Ragweed** 233
  - **Sesbania Pea** 273
  - **St. Barnaby's Thistle** 271-2
  - **Wild Turnip** 5-6

Wheat Marketing 67-8, 183
Wild Turnip 5-6
Windmill Controller 117
Wool as a Textile 299
Worm Parasites—
  - **Cattle** 371-5
  - **Pigs** 30-51, 109-11
  - **Sheep** 238-9, 301-4

Y

Yellow-wood 273

INDEX TO ILLUSTRATIONS

PAGE.

A

Anchor Bolts in Concrete 58
Apple Little-leaf 216, 217, 218
Apple Measles 224, 225
Apple Withertip 219-22

B

Bagging Needles 378
Banded Pumpkin Beetle 138
Barbed-wire Roller 58
Black Passion Bug 148
Bottle-jaw of Sheep 239
Brown Cutworm 79
Brown Scarab Beetle 347
Bumper-bar Buffer 314

C

Cabinet for Papers 186
Cleavers for Milk Tubes 356
Cloncurry River 214
Collins, Hon. H. H 196
Concrete Mixer 249
Condamine River 294
Corn Ear Worm 85, 349
Cotton Breeding Plot 54
Cow Rugs 378
Crown Borer 86
Cucumber Moth 145
Cucurbit Shield Bug 147
Cucurbit Stem Borer 146

D

Ducks 361-9

E

Edington Water Hole 182
Egg Candler 186
Eungella Range Road 353

F

Feed Mixer 123
Fork Rack 123
Fruit Spotting Bug 230-2

G

Grain Sorghum Crop 29
Grape "Hen-and-chickens" 75, 77, 226
Green Vegetable Bug 147, 350

I

Irrigation of Tomatoes 241, 242

PAGE.

L

Leaf-eating Ladybird 140, 141
Leaf Roller 81, 82
Louse of Pig 48
Lucerne Mowing 300
Lucerne Pests 79-89

M

Mango Scale 11
Mango Weevil 13
Manure Heap 267
Melon Aphid 142
Mite, Mange 49, 50

P

Papaw Crops 202-13
Papaw Fruit Spotting Bug 230-2
Peanut Loading 54
Peanut Pests 346-52
Pigs—
  Branding 161-72
  Ear Notching 112-5, 167-70
  Livers 31
  Louse 48
  Mites 49-50
  Paddock 51
  Parasitic Worms 32-47
  Trough Handles 120
Poona Pea Crop 264, 265

R

Red-shouldered Leaf Beetle 352
Red Spider 143

S

Sack Opener 186
Scarabaeid Beetles 346
Sorghum Crop 29
South Burnett Lands 29, 51, 118, 289, 300
Star Charts 191, 255, 319, 383
St. Barnaby's Thistle 272

T

Tomato—
  Crops 333
  Irrigation 341, 342
  Jassid 83
  Pruning 330, 331
  Staking 340
  Transplanting 329, 330
  Trellising 332-9
Twine Holder 58

W

Water-cooling Tower 282-8
Williams, Hon. T. L. 4
Windbreaks 262, 263
Windmill Controller 117
Worms of Pigs 39-47

AUTHOR INDEX.

PAGE.

A

ABERDEEN, J. E. C. —
Notes on Fungicides for the Control of Tomato Foliage and Fruit Diseases 274-7

AGNEW, G. W. J.—
Papaw Culture in Queensland 202-14

B

BOSTOCK, F.—
The Marketing of Pigs 295-6

BRIMBLECOMBE, V. J. (with L. E. Nichols, W. J. Park and G. R. Sigley)—
Milk Supplies and Cheese Quality 92-7

BURGESS, L. A.—
Water and Salt Control in Butter-making 151-6

C

CLAY, A. L.—
Management of Pigs in Relation to Disease Prevention 9-111

CLAYTON, S. A.—
Device for Inspecting Milk Tubes 356

F

FEW, F. G.—
A Water Cooling Tower for Milk and Cream Cooling on the Dairy Farm 279-89

G

GRANT, K. M.—
Colics of the Horse 304-8

GRIEVE, C. R.—
Ear Notching of Pigs 111-5

H

HAMILTON, A.—
Conditioning Bulking and Grading Flue-cured Tobacco 198-201
Flue-curing Tobacco 133-6

HASELER, R. E.—
Soil Conservation and Erosion Prevention 69-73

J

JARDINE, F. A. L.—
The Use of Borax on Waltham Cross Grapes in the Stanthorpe District 74-8

JARVIS, H.—
Pests of the Mango 10-14

JARVIS, H, (with J. Harold Smith) —
Lucerne Pests 79-89

PAGE.

M

MAY, A. W. S.—
Pests of Cucurbit Crops 137-50

McCALLUM, P.—
Washing Dairy Utensils 156-7

McKNIGHT, T.—
Water Blister Disease of Pineapples 278

McLACHLAN, J. J.—
Practical Duck-keeping 360-70

McLAUCHLAN, A. W.—
The General Farm Poultry Flock 297-9

MORGAN, C. N.—
Soil Preparations and Transplanting of Tomatoes 328-44

MOULE, G. R.—
"Swelled head" of Sheep 15-16, 90-1, 238-40

N

NICHOLS, L. E. (with W. J. Park, G. R. Sigley and V. J. Brimblecombe)—
Milk Supplies and Cheese Quality 92-7

P

PARK, W. J. (with L. E. Nichols, G. R. Sigley and V. J. Brimblecombe)—
Milk Supplies and Cheese Quality 92-7

PETERS, R. W.—
Commercial Cotton Varieties Recommended for the 1946-47 Season 325-7

PREST, R. L.—
Propagation of Citrus Trees 7-9

R

RICE, E. B.—
Queensland Butter Production, 1944-45 17-27

ROBERTS, F. H. S.—
Nodule Worm Disease of Sheep 301-4
Parasitic Diseases of the Pig 30-51
The Use of Phenothiazine for the Treatment of Worms in Cattle 371-5

RUMBALL, P.—
Eggs—Preserve Their Quality 241-6
Incubation Importance of Nutrition 174-80
Transport of Poultry to Market 52-3

S

SIGLEY, G. R. (with L. E. Nichols, W. J. Park and V. J. Brimblecombe)—
Milk Supplies and Cheese Quality 92-7

SLOAN, W. J. S.—
The Fruit Spotting Bug 229-33

SMITH, J. Harold—
Pests of the Peanut Crop 345-53

SMITH, J. Harold (with H. Jarvis)—
Lucerne Pests 79-89

SMYTHE, V. R.—
Milk Spoilage by the Can 234-5

SUTHERLAND, A. K.—
Warts in Cattle 308-9

PAGE.

T

TUMMON, C. R.—
Percentage of Butterfat in Cream 354-6
Some Points in Herd Management . 290-1

V

VALLANCE, L. G.—
The Soil and Cultural Requirements of the Tomato 261-70

PAGE.

W

WARD, K. M.—
Deficiency Diseases in Deciduous Fruits 215-28

WHITE, C. T.—
St. Barnaby's Thistle 271-2

WINDERS, C. W.—
Control Measures for Wild Turnip ... 5-6

A. H. TUCKER, Government Printer, Brisbane.

Volume 62 Part 1

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J F F REID
Associate Editor
C W WINDERS, B Sc Agr

JANUARY, 1946

Issued by Direction of
THE HONOURABLE T. L. WILLIAMS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER BRISBANE

Contents

PAGE.

Event and Comment—
  Extension of Agricultural Research .. 3
  The Minister's New Year Message .. 4

Field Crops—
  Control Measures for Wild Turnip .. 5

Fruit Culture—
  Propagation of Citrus Trees 7

Plant Protection—
  Pests of the Mango 10

Sheep and Wool—
  "Swelled Head" of Sheep 15

The Dairy Farm—
  Butter Production 17
  Production Recording 28

The Pig Farm—
  Parasitic Diseases of the Pig .. 30

The Poultry Farm—
  Transport of Poultry to Market .. 52

General Notes—
  Carcasses Control by Northern Pig Board 55
  Pasteurization Plant at Rockhampton 55
  Staff Changes and Appointments .. 55

PAGE.

Rural Topics—
  Science Sees the Farm Through .. 56
  Farming in America—Some Highlights and Sidelights 57

Gadgets and Wrinkles—
  Anchor Bolts in Concrete 58
  Barbed Wire Roller 58
  Old Funnel for Twine 58

The Farm Home—
  Fathercraft 59
  Salads 60

Astronomical Data for February .. 61

Queensland Weather in December .. 62

Rainfall in the Agricultural Districts—
  November Rainfall 63
  December Rainfall 64

Climatological Table—
  November 63
  December 64

S. P. A.
(SAVE POUNDS ALWAYS)

IMPORTED SEED OATS

The heaviest, cleanest, and best oats only purchased for seed by us and then these are RECLEANED, REGRADED and CLIPPED.

NO WASTE—NO WEEDS

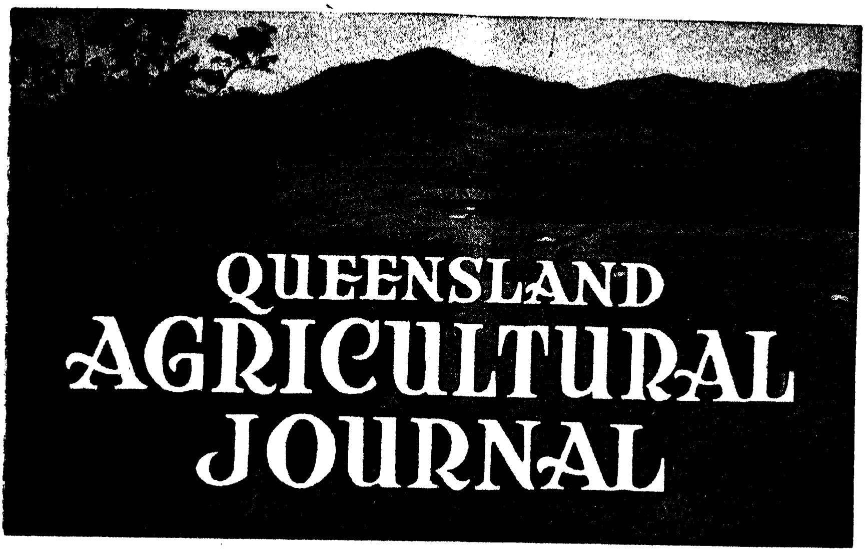
Algerians
Fulghums
Sunrise
Belars
Mulgas
Buddahs

BOOK NOW—prices are reasonable.

DELIVERY WHEN REQUIRED.

STATE PRODUCE AGENCY Pty. Ltd.
Agricultural Seedsmen, Farm Produce Agents,
266-274 ROMA STREET, BRISBANE.

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, including postage. General Public, **Ten Shillings**, including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Volume 62 1 JANUARY, 1946 . Part 1

Event and Comment.

Extension of Agricultural Research.

FOR the Department of Agriculture and Stock, the past year was one of substantial progress. Under its new divisional organisation, the Department has the ground already cleared for further advancement in the coming year.

Plans for the immediate future include a very considerable intensification of research and experimental work. With a view to implementing this aspect of the departmental programme, the Government decided some months ago to reopen the Hermitage, near Warwick, as the regional experiment station for the Darling Downs. It has also been decided that the property of the Department at Kairi, which has been occupied by the Army for several years, will be reopened as soon as it is available, the intention being that it should serve as a regional experiment station for the Atherton Tableland and other Cairns hinterland districts.

Another important contribution to the extension of research and field experimental facilities is the recent purchase of a suitable and conveniently located property in the Maroochy district to serve the purposes of a Maroochy horticultural experiment station at which a wide range of fruit and vegetable problems will be investigated.

The research and experimental work, of course, will not be confined to the experiment stations, the work at those centres being supplemented by field trials throughout the districts which the stations are intended to serve.

These and other developments will obviously be of great value to the primary producers of Queensland, to whom results will become progressively available through a strengthened extension service.

THE MINISTER'S NEW YEAR MESSAGE

★

AT the beginning of another year I wish to record my cordial appreciation of the outstanding achievements of the farmers and graziers of Queensland during the past year in face of many difficulties, seasonal and otherwise, and also of their continued friendly and valuable co-operation with me and the officers of my Department.

The year just ended brought victory, but not without sacrifice and suffering. We acknowledge our debt to those who fought for us, and our thoughts and heartfelt sympathy are with all those families to whom the war brought bereavement.

We now have to make our contribution to peacetime readjustments, and to the solving of the pressing problems of a post-war world. Our job will not be easy, but its accomplishment will come from the strength which lies within ourselves. None of our immediate tasks of reconstruction and further development is, however, beyond the means and capacity of a vigorous and skilful people; and we will surely tackle those tasks in the same spirit which saved our country from invasion and ultimately gave us the victory.

The need for essential food production in 1946 will be just as great as it was in 1945, and for a long time yet the demand for our exportable surpluses will be just as strong. Therefore, the maintenance of adequate food supplies of the highest attainable quality remains for us an essential duty.

To all the primary producers of Queensland and their families I wish health, happiness and prosperity throughout the coming year.

T. L. Williams.

Secretary for Agriculture and Stock.

1st January, 1946.

Field Crops

Control Measures for Wild Turnip.

C. W. WINDERS, Agrostologist.

VARIOUS plants belonging to the mustard family occur as weeds on the Darling Downs. During the winters of 1944 and 1945, two or three of these plants, commonly called "wild turnip," were present as heavy infestations in crops and grassland and on fallows and roads in various districts. The prevalence of wild turnip caused considerable alarm to farmers in 1945, but the infestation was so dense in some areas that the best a farmer could do to protect his property from heavy re-infestation during 1946 was to destroy the weeds on his farm and on adjacent roads before they had seeded. The weeds seeded so heavily on many properties and roads, however, that if seasonal conditions are favourable this year most farms in the heavily-infested districts and many previously clean will be troubled with wild turnip.

Farmers who suffered crop losses during 1945 due to wild turnip, and those who were put to the trouble and expense of handling the weed in the flowering stage to prevent seeding, realize that it is most satisfactory to deal with the pest in its young stages. This note is written as a warning to farmers who may not be seized with the importance of eradicating wild turnip in the early stages; that is, in the seedling and rosette stages, before the erect stem is produced.

Treatment During Summer.

Although the wild turnip weeds are normally winter-growing annuals, germinating with the autumn rains and dying after seeding in the spring months, there is likely to be some out-of-season germination in the warmer months. Farmers should watch for seedlings of these weeds and destroy them before they develop into firmly established plants. Fallows are easily kept clean by cultivation if the weeds are handled early. Plants surviving cultivation and those in pastures and other parts of the farm should be eradicated by hoeing. Under no circumstances should the light summer infestation be allowed to seed. Their yellow flowers enable the plants to be readily observed in the early flowering stage, and at the latest the plants should be eradicated then. Prevention of seeding during the summer months is regarded as particularly important on properties which have not been heavily infested by the weed.

Control of the Main Infestation.

Where the 1945 infestation was only light, farmers may be able to control the weed simply by refraining from planting winter crops until the weeds germinating with the autumn rains have been struck out. It is desirable to wait for the second wave of germination if seasonal conditions do not force earlier planting. Planting before the bulk of the wild turnip seed has germinated and the seedlings destroyed is likely to result in a troublesome infestation of the crop. If the weed seeded freely during 1945 on or adjacent to the farm, or if running water is likely to have carried seed on to the cultivations from other places, the farmer should not plant winter crops during 1946, but should allow the land to fallow during the winter months. Systematic working of the land during the fallow period would eradicate the bulk of the weed, and at the same time have the effect of keeping the land in good tilth for the reception of summer-growing crops.

During the growing period of winter crops, systematic weeding to eliminate wild turnip is desirable. In many cases seeds of the weed are likely to germinate in the young crop; if allowed to develop into adult plants these will cause difficulties in harvesting, will probably lower the grade of the grain, and by seeding will accentuate the weed problem in the following year.

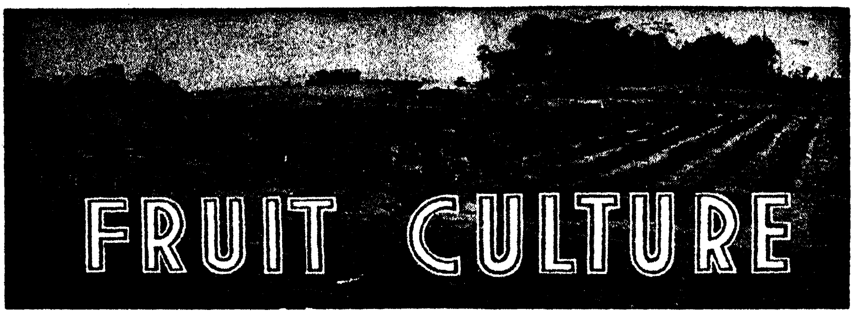
Headlands should be kept clean by regular cultivation, and whatever measures may be practicable should be employed to prevent the weed seeding on roadways, gullies, watercourses and so on. Fence-lines provide a special problem, in that cultivation implements cannot deal satisfactorily with weeds directly beneath the wires. In such situations, hoeing or spraying with chemical weedkillers should be employed.

Investigational work which has been planned may enable further recommendations to be made later for dealing with the infestation which may occur in the winter of 1946. Farmers in hitherto relatively free areas are urged to take all precautions in the meantime against the spread of the weed on their farms.

A SPECIAL RADIO SERVICE FOR FARMERS

★ ★

The COUNTRY HOUR, a special service for farmers, is broadcast DAILY through the National and Regional Stations from 12.15 to 1.15 (mid-day)



Propagation of Citrus Trees.

R. L. PREST, Senior Adviser in Horticulture.

DURING the war years, because of the shortage of manpower, nurseries were compelled to reduce their output of many kinds of fruit trees, including citrus. In consequence, there were not enough young trees available to meet the demand for the planting of new areas. Consequently, many enquiries have been received by the Department from growers for advice on the raising of fruit trees. The following notes are published as a guide to the procedure usually adopted.

The Seed Bed.

The seed used for the raising of root stocks is very important. It is unsound practice to select seed indiscriminately, and unwise to imagine that all resultant seedlings will always grow into good, profitable trees. Seeds of the seedling bush lemon or, as it is sometimes called, the common rough lemon, are most commonly used for root stocks in Queensland; next in order of preference is seed of the seedling sweet orange. The seedling lemon stock is easier to bud than the orange and the resultant tree also grows faster, but it is usually not so long-lived as the orange and the fruit tends to be of a somewhat coarser texture.

The seed beds should be located in a convenient place so that they can be easily watered and readily observed. They require to be carefully prepared and deeply dug as far as the subsoil. The soil should be broken up finely and then evenly levelled. Medium to light sandy loams make the best seed beds and they may have humus added in the form of rotted grass and leaf mould, but it is not advisable to add large amounts of animal manures. The beds should be laid out about 4 feet apart, with wide paths on either sides. Good drainage is, of course, essential, and this will be facilitated if the beds are built up a few inches above ground level. Only seed from clean, healthy and vigorous seedling trees should be selected.

The seed may be extracted from the fruit by cutting off about a quarter of the top and squeezing out the seed and juice into a container, preferably of wood. Fresh water may then be added, and several washings will leave the seed quite clean. Seed also may be extracted by placing whole fruits which have been previously bruised in some way into a barrel and allowing them to rot and ferment. This may take two to three weeks after which the seed can be washed free from the pulpy mass with running water. If care is used it will be found that most of the poorly developed seed will float and wash away when pouring off the water, while the good, heavy seed will sink to the bottom.

After washing, the seeds may be dried in the sun, but care should be taken that they do not become too dry, otherwise the cotyledons separate and the seed will not germinate. To obtain best results, it is advisable to plant citrus seeds as soon as possible after extraction from the fruit. Orange seed begins to lose its viability after about a week; lemon seed is hardier and will keep fairly well for several weeks. If it is desired to keep seed for a period, it is best to leave it in the fruit or in the pure juice of the fruit and not to squeeze, wash and dry it until it is required.

The seeds should be sown about ½-inch to 1 inch apart in rows about 3 inches apart. Three-quarters of an inch to 1 inch is sufficient depth at which to plant and if clean river bed sand is available this is the best medium to use for covering the seed in the rows. The top of the ground should be kept stirred occasionally to suppress weed growth and the beds kept well watered, particularly if the weather is warm and dry.

Fungous diseases such as citrus scab sometimes attack citrus seedlings, and retard their growth, particularly in the case of rough lemon seed beds, and it is a wise precaution to spray from time to time with Bordeaux mixture.

The Nursery Row.

When the young seedlings are about 6 to 8 inches high and the growth on the tops has hardened up, they are planted out about 9 to 12 inches apart in well-prepared ground in what are termed nursery rows, so that they will have more room to develop to the state where they are ready for budding.

The nursery rows may be 4 feet apart. When transplanting, the seed beds should be given a good watering the evening before, in order to facilitate the removal of the plants without excessive injury to the roots. After lifting from the seed bed, the roots should be trimmed and the tap root suitably cut back, leaving about 3 to 4 inches. The plants should then be set out in drills in the nursery rows, care being taken to spread the lateral roots so that they are not all bunched together. Weak or crippled plants should, of course, be rejected.

Budding.

When the stocks, as they are now termed, have grown sufficiently and the stems have attained a diameter of about three-eighths of an inch at the base, they will be ready for budding. In Queensland, this is usually done during the spring or autumn months, when the sap is flowing freely under the bark and the stocks are therefore in active growth.

The T method of budding is usually practised in Queensland and is performed by making, firstly, a vertical cut about 1¼ inches long just through the bark without injuring the wood underneath. The bottom end of the cut may be about 2 inches from the soil surface. Next, a cut is made from left to right across the top of the vertical cut to form a T. If the knife is held at an angle and the cut made with a twist the bark at the top of the vertical cut will lift slightly and enable the bud to be inserted without quilling. The bud is held between the thumb and finger of the left hand, inserted in the bark at the top of the cut, and gently pressed down with the thumb, when, if the sap is running freely, the bark will lift and the bud will enter easily.

The T cut should preferably be made on the south side of the tree, for on that side the bud will not be so readily dried out by the sun.

Budwood should be taken only from the best trees in the orchard, which are noted for their healthy and vigorous growth and for consistent production of heavy crops and quality fruit. Budwood should be selected from trees only when they are dormant, i.e., when there is no young tender growth on the tips of the branches. The wood selected should be well rounded, about one-quarter to three-eighths inches in thickness, and preferably not more than one year old. The last growth should be discarded. The junction of the last growth and that preceding it, which is the growth to select for budwood, is readily discernible and is indicated by what is generally referred to as a joint.

After cutting the budwood, the leaves should be trimmed off, leaving a piece of the leaf stalk or petiole for each bud, so that it may be more easily handled after cutting. The bud may be cut off the bud stick, commencing either from above or below, but generally the practice is to start from the bottom of the bud and cut upwards, commencing about half an inch below the bud and ending about 1 inch above. The bud should be removed with one cut of the knife only, and should be just deep enough to remove only a very thin layer of the wood. If a very sharp, thin-bladed knife is used, the buds may be cut without difficulty.

The bud should be inserted under the bark of the stock as soon as possible after it has been cut, in order to prevent the sap from drying out. If the bark of the stock does not lift freely enough to permit the bud to be pushed down easily, the knife may be used to help loosen it. The bud should be pushed down until the top end is just level with the cross cut.

In order to bring the bud and the stock into the closest possible contact and to exclude air, they are then bound tightly together. Raffia is usually used for this purpose, but where this is not handy a piece of soft twine which will not cut into the bark may be used. Tying should commence from the bottom of the T cut and work upwards, leaving only the bud exposed. In from two to three weeks, if the operation has been successful and the bud remains green, it can be considered to have united with the stock. The tie may then be cut on the opposite side of the stock to that in which the bud was inserted.

When the budding has been done in the autumn, the trees may be left as they are until the following spring, but if they have been done in the spring the buds may be made to start into growth at once by removing a portion of the top of the stock or the stock may be cut half-way through, a few inches above the bud but on the reverse side, and it may be split up the middle and the top bent over on to the ground so that it is above the bud. In the case of buds which have remained dormant during the winter, the whole of the stock may be removed a few inches above the bud early in spring before growth starts. The few inches of the stock left above the bud may be used as a support to which to tie the young shoot from the bud, but when it is strong enough to support itself the remainder of the stock should be cut clean away with a sloping cut made just slightly above the bud. The wound will then rapidly heal over and the union will be practically a perfect one.

To those who have never done any budding previously it is suggested that they practise on young saplings growing in the bush.

PLANT PROTECTION

Pests of the Mango.

H. JARVIS, Entomologist.

LIKE other fruit trees, the mango is attacked by several insect pests, the more important of which are the mango scale, the pink wax scale, the mango tip borer, the mango weevil, and the Queensland fruit fly. The importance attached to control measures for the several insect pests which attack the mango depends entirely on the owner's interest in the trees. The vigor of the mango is considerable and temporary checks caused by insects have apparently little effect on its capacity to bear fruit. On the other hand, foliage pests may completely spoil the appearance of the trees and thus prejudice their value as ornamentals. It is not surprising therefore that control measures for the two most important scale insect enemies of the mango are used to some extent at least on young trees which can be effectively treated with the equipment available on the farm or orchard. Well-grown, tall trees could only be treated with a very elaborate spray outfit. As the better varieties of the mango yield an excellent fruit, there can be little doubt that, in the future, the need for pest-control measures will become more widely recognized than at present.

MANGO SCALE.

The mango scale* is perhaps the best known of the several insects attacking the foliage, for few trees are free from this pest. In severe outbreaks, the leaves are flecked with white spots, which are the insects themselves, and each spot is margined by a yellow discolouration of the adjacent tissues of the leaf. The discolouration caused by any single scale is slight but, if a large number of scales are present on each leaf, the tree presents a definitely unhealthy appearance (Plate 1). Premature leaf fall is also attributed to extensive infestation by this insect.

Life History and Habits.

The yellow, pear-shaped insect itself is sheltered beneath a parchment-like scale and is seldom seen. The scale of the female of this species is white in colour, about one-tenth of an inch in length, elongate-oval in shape, and tapers at one end which is characterized by the presence of a small, yellowish, hardened cast larval skin. The scale of the male is also white, but is smaller and almost rectangular in shape with two grooves along the upper surface. The life history of the insect is apparently similar to that of some better known scales. The young, yellow crawlers leave the shelter of the parent scale and wander over the plant until they find a suitable place at which to feed on the leaves, and this is usually on the under surface. They then begin to feed through hair-like mouth parts which are inserted into the tisue of the leaf. The limbs are lost soon after the crawler settles down and scale formation proceeds rapidly and continues until the insect reaches maturity.

---

* *Chionaspis dilatata* Green.

Control.

The mango scale, when necessary, can be controlled by applications of a summer white oil emulsion at a strength of one in forty. In practice, however, control measures are only applied to young trees. Older trees are too large for efficient treatment with the usual type of spray equipment available.

PINK WAX SCALE.

Though usually less conspicuous than the mango scale, the pink wax scale* can similarly spoil the appearance of an infested tree and, possibly also, its cropping capacity. Typically the twigs of such a tree are covered with pink globules of wax-like material which may merge together until the younger, woody growth is almost covered by the insects. On the leaves, the scales tend to settle along the main veins in more or less continuous lines. Infested parts of the tree are covered by a black, sooty mould which gives the tree an unsightly appearance. This mould growth develops on exudations secreted by the insect, but it is not harmful to the tree.

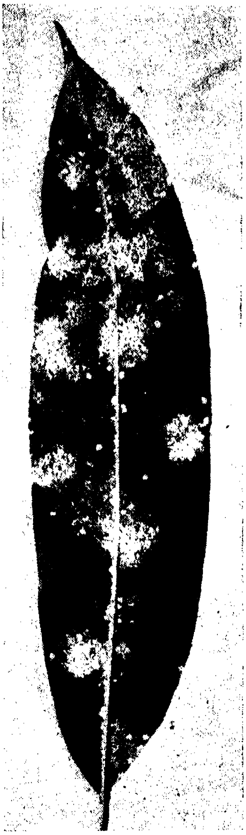


Plate 1.
LEAF INFESTED BY MANGO SCALE.

Life History and Habits.

The pink wax scale is best known as a pest of citrus trees on which its life history has been worked out in detail. Its behaviour on the mango is essentially the same. The scale is almost globular in shape, about one-eighth of an inch in diameter, and brownish-pink in colour. There are at least two generations in each year and these are initiated by the mass emergence of minute crawlers from the adult scales. These young crawlers move over the plant and select a feeding site, frequently along the main veins of the leaves. They then lose the use of their limbs and, as they grow, they secrete a constantly enlarging waxy covering.

Control.

When treatment is considered desirable, the soap-washing soda spray widely used in citrus orchards for the control of this pest should be reasonably efficient. The spray is prepared by shredding 5 lb. of good-quality laundry soap into a solution containing 12 to 14 lb. of washing soda dissolved in 4 gallons of water. After heating the mixture until the soap is dissolved, water is added to make 75 gallons of spray. Treatment should be confined to periods of the year when the young scales seen on the trees are of "pinhead" dimensions.

---

* *Ceroplastes rubens* Mask.

The spray is less effective against the older stages and conversely, if it is applied too soon, many of the crawlers may not yet have emerged from the protecting cover of the parent insect. The normal seasonal development of the insect is such that control measures can best be applied in November and again in early March, but treatments should, so far as possible, be timed by observations on the behaviour of the insect on the trees.

MANGO TIP BORERS.

Tip borer damage in mango trees has been recorded from North Queensland, where, in some years, the injury may be appreciable. The first sympton of infestation by these insects is a wilting of some of the growing tips on the outside of the trees, accompanied by a blackening of the leaves on such twigs. Later the affected tips die back and dormant buds on the more mature wood develop and produce a bunched type of growth. Inside each of the affected twigs is a hollow cavity containing the debris normally associated with insect larvae. The caterpillars of the tip borers may actually be found inside the twigs when they are showing the early wilting symptoms.

Life History and Habits.

The larvae of two moths are concerned in tip borer damage. The larger of these* has a wing-spread of about 1 inch and is dark-brown in colour with lighter markings across the forewings. The hind wings, however, are white with a broad, smoky-brown margin. The second moth† is smaller, being about five-eighths of an inch across the expanded wings, which are coffee-brown in colour and broken by thin, symmetrical, and somewhat paler bands. The life histories of these moths are unknown but it is presumed that the eggs are laid on the young growth —usually in spring—for the damage is then most commonly encountered. The larvae found in the young shoots are soft-bodied, pale in colour, and relatively inactive. They normally work from the tip downwards to the thicker part of the shoot. When full fed, they pupate in silken cocoons spun within the damaged shoots and from these cocoons the moths later emerge.

Control.

Tip borers of any kind are extremely difficult to control, even where insecticides can be applied without the difficulties inherent in the treatment of such a large, spreading tree as the mango. Should the application of an insecticide be required, control would probably depend on the use of an arsenate of lead spray or dust applied in late spring and early summer when growth is taking place and the effects of an attack are most serious.

MANGO WEEVIL.

The mango weevil‡ is of more interest to the nurseryman than to the owner of established mango trees. This insect is essentially a pest of the seed and its activities only become apparent when faulty strikes in propagation beds are investigated or the seed is cut to remove the kernel prior to planting. Then it is not uncommon to find that the kernel has been riddled by the larva of the mango weevil and almost completely destroyed. Frequently the weevil in its larval, pupal, or adult stages is present when the seed is cut open.

---

* *Bombotelia jocosatrix* Gn.

† *Paperila euthysticta* Turn.

‡ *Cryptorhynchus mangiferae* Fabr.

Life History and Habits.

The mango weevil occurs in most tropical countries in which its host plant is grown at all extensively. The hard-bodied adult weevil is about three-eighths of an inch in length, is broad in shape and has a downwardly projecting beak. It is dark-brown in colour with oblique, lighter marks on the wing covers and a cross-shaped, light-brown mark immediately behind the head. Like many other weevils, it feigns death when disturbed. Usually the adult lays only one egg on each young fruit and the grub-like larva hatching from it bores directly through the flesh into the developing kernel. The small hole made by the larva soon heals over and the flesh develops normally so that there is no outward trace of the insect feeding inside the kernel. The larva tunnels through the kernel for a few weeks (Plate 2) and by the time the fruit is ripe it is full-grown. Pupation then takes place within the injured seed and, in a week or two, the adult weevil emerges from the pupa. The newly developed weevil may remain in the seed for many weeks before it makes its way through the seed covering to escape to the open. The adults normally remain until the following season in the vicinity of the tree in which they have been reared, usually in bark crevices or some similar shelter. The dispersal of the pest must therefore largely take place through the medium of fruit and seeds carried from one district to another.

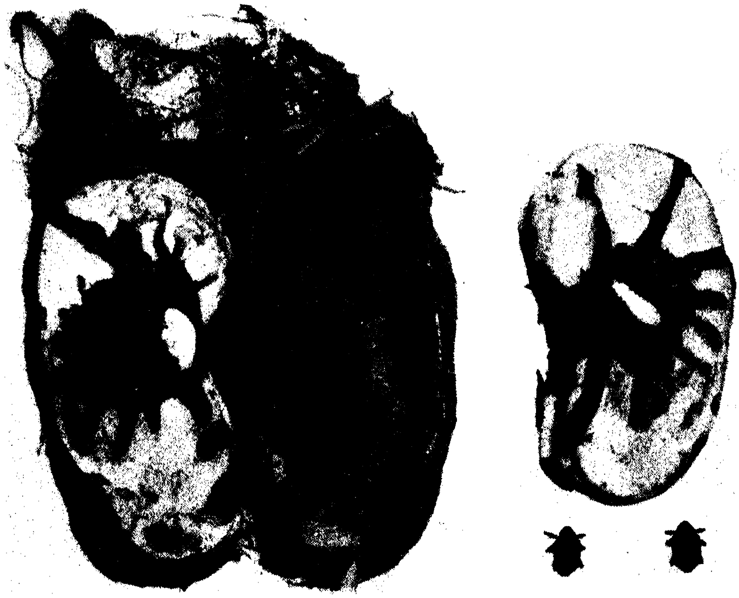


Plate 2.

MANGO WEEVIL.—Seed on left exposed to show damage with pupa *in situ*. Detached kernel on upper right. Adult weevils on lower right.

Control.

The control of the mango weevil is quite impracticable. In the propagation beds the risk of faulty strikes can be offset by planting seed far in excess of probable seedling requirements. Alternatively, if bed space is at a premium, the available seed may be shelled and only the sound kernels planted in the beds. The seed must be carefully opened by paring the ridge with a sharp knife and then the kernels must be examined to ensure that they are free from weevil infestation and otherwise sound before being planted.

QUEENSLAND FRUIT FLY.

Attacks by the Queensland fruit fly* on mango fruit are often severe. The infested fruit may ripen prematurely after first showing traces of an uneven colouration during the later stages of its development. Fruit-fall frequently occurs and fallen fruit contain many maggots burrowing through the flesh.

Life History and Habits.

The Queensland fruit fly is about three-eighths of an inch in length, the body being reddish-brown with bright yellow markings. The female lays batches of eggs through the skin of the fruit and the punctures made in doing so can later be detected by the presence of a brownish stain. On hatching from the eggs, the maggots immediately burrow into the flesh where they feed until they are full-grown. They then leave the fruit which has, by this time, generally fallen from the tree, and enter the ground, where pupation takes place inside an oval, dark-brown pupal case. From this the adult fly later emerges. In summer the life history may be completed in little more than a fortnight.

Control.

The orthodox measures used in deciduous fruit and citrus orchards for the control of fruit flies are hardly applicable to the mango, except, perhaps when the trees are very young. These control measures include luring, the use of bait sprays, and the regular collection and destruction of fallen fruit. Lures and bait sprays can scarcely be efficiently used on large trees; the destruction of fallen fruit, however, should be regularly carried out as a routine measure, particularly as it lessens the risk of severe attack in other fruits which mature later in the season.

---

* *Strumeta tryoni* Frogg.

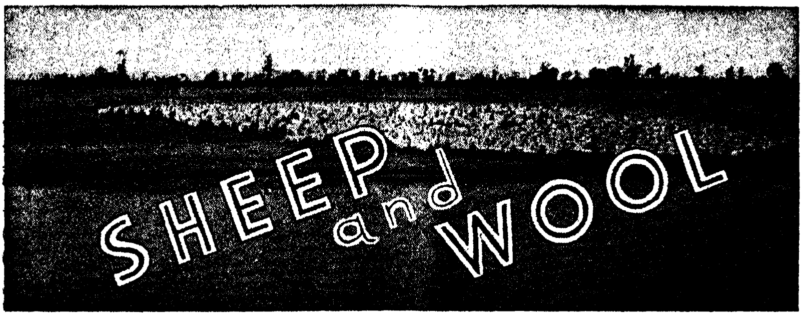
THE COUNTRYMAN'S SESSION

Sunday Morning Radio Service to Farmers

(By arrangement with the Australian Broadcasting Commission)

Farmers are recommended to tune in to either a
Queensland National or Regional Station.

EVERY SUNDAY AT 9.30 a.m.



"Swelled Head" of Sheep.

G. R. MOULE, Veterinary Officer, Sheep and Wool Branch.

SEVERAL disease conditions which cause a marked enlargement of the sheep's head occur in Queensland and this symptom is commonly referred to by graziers as "swelled head." As the diseases are quite distinct from one another, despite the constant feature of the "swelled head," a detailed description of each will be given in a series of *Journal* articles of which this is the first. Methods of diagnosis and control will also be dealt with. The conditions considered are blackleg, white oedema, malignant oedema, gas gangrene, photosensitisation and bottle jaw.

BLACKLEG.

Although blackleg is usually considered to be a disease specific to cattle depastured on coastal areas, recent investigations have shown that it occurs fairly extensively amongst sheep in western Queensland. The majority of cases which have been investigated have occurred in young rams of about 12 months of age, though older sheep have been affected. The disease has also been seen in ewes in Queensland but not to the same extent as in rams.

Cause.

Blackleg is caused by a specific bacteria which is fairly common in the soil. It belongs to that class of organism which thrive only under those circumstances where oxygen is not present in the surroundings—i.e., the causative organism is an anaerobe. The exact way in which the disease is reproduced is not known, but it is thought that the specific bacterium which causes the disease is ingested with the food and after gaining entrance to the blood stream through the small vessels in the intestine is carried to the muscles. When the chemical reaction of the muscle is suitable the bacteria multiply rapidly and death quickly ensues.

Symptoms.

As death is very rapid after the development of the disease, symptoms are often missed. Should they be observed they include:—

(1) "Swelled head," seen in many cases; but this symptom is not always present as its development depends upon where the blackleg bacteria become localised after circulating in the blood stream. When present the swelling is fairly firm, pits on pressure and usually extends

over the muzzle, around the eyes and to the ears, under the jaw and perhaps down the throat to the folds of the apron. The skin over the swollen area is usually discoloured, being deep purple and subsequently blackish.

(2) Lameness may be a feature of the disease and this occurs when the causative organisms become localised in the muscles of one of the limbs. Occasionally swelling of these muscles occurs and the skin over the affected area is discoloured, but there is a noticeable absence of any "crackling" under the skin, as is seen in blackleg of calves. After death the affected muscles become puffy and more swollen, and some gas develops in the lesion, but crackling to the touch is difficult to detect.

(3) Affected animals show a marked rise in temperature, are listless and segregate themselves from the flock. Breathing is rapid and is inclined to be panting and in the terminal stages or soon after death there is a frothy blood-stained discharge from the nose.

Post Mortem Findings.

Owing to the virulence of anaerobic infections it is recommended that graziers should seek the assistance of technically trained men who have had experience in carrying out postmortems of animals suffering from infections by these organisms.

The characteristic changes which will be found in the body organs include:—

(1) The tissues of the swollen areas of the head or limb muscles are hæmorrhagic and filled with a watery blood-stained exudate. The muscle fibres give the impression of having been "water-logged," as they are swollen and darkened. In cases which have been dead for some little time prior to post-mortem, there may be some gas formation which causes small circumscribed cavities to occur among the muscle fibres. When the blackleg lesion develops in limb muscles a characteristic feature is the way in which the affected muscles may be completely surrounded by apparently healthy and unaffected muscles. The lymph glands draining the affected part are enlarged and inflamed.

(2) The internal organs show changes which are fairly typical of anaerobic infections and these may be summarised as blood-stained spots on the lungs, heart muscle and sac and some enlargement of the spleen.

Diagnosis.

Diagnosis is based upon the microscopic examination of specimens collected from affected or recently dead animals and upon biological tests carried out on experimental animals in a laboratory. Accordingly, should a sheep owner suspect the presence of blackleg in his sheep he should seek technical assistance.

Control.

Blackleg is readily controlled by vaccination. The cost of the specific vaccine is about one guinea per hundred doses.

Queensland Butter Production, 1944-45.

E. B. RICE.

THE accompanying tables cover the operations of all butter factories for the year ended 30th June, 1945, and have been compiled and tabulated from monthly returns in accordance with the requirements of *The Dairy Produce Act*.

A scrutiny of the figures indicate the quantity of butter in each grade made by the respective factories, and the quantity of butter in each grade for which suppliers were paid. The official gradings column indicates the results of the gradings of butter examined officially by both Commonwealth and State officers.

The information contained in these tables is of particular interest to suppliers, as well as to factory managements and directorates.

SUMMARY OF PRODUCTION AND GRADINGS OF BUTTER FOR THE YEAR ENDED 30TH JUNE, 1945.

MANUFACTURE IN LB.

Total.	Choice.	First.	Second.	Pastry.
93,931,828	59,910,059	29,991,890	3,965,822	64,057

PAY IN LB.

Total.	Choice.	First.	Second.	Pastry.
93,967,063	61,355,437	29,218,213	3,383,643	9,770

OVER-RUN.

Actual	2,926,440	= 3·21%
Paid	2,961,675	= 3·25%

GRADINGS IN BOXES.

Submitted as :—

Choice.	Choice.	First.	Second.	Pastr
749,719	571,119	178,118	482	..
..	76·18%	23·76%	·06%	..
First.				
445,043	..	423,527	21,391	125
..	..	95·16%	4·81%	·03%
Second.				
67,379	..	..	60,854	6,525
..	..	..	90·32%	9·68%
Pastry.				
1,411	..	..	..	1,411
..	..	..	..	100%

Percentage of Production Graded = 75·33%.

PRODUCTION, PAYMENT, AND GRADINGS OF BUTTER IN QUEENSLAND FOR THE YEAR ENDED 30th JUNE, 1945

Factory.		Manufacture and Payments in Lb.					Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Atherton	Make	1,400,299	1,400,299	. .	. .	. .	27,236	52,148	. .
	Pay	1,425,211	1,414,424	. .	10,787	. .	1·98%	3·79%	
Bushy Creek	Make	40,007	. .	40,007	. .	. .	216	379	. .
	Pay	40,170	. .	40,170	. .	. .	·54%	·95%	
Caboolture	Make	2,058,100	1,861,487	196,109	504	. .	67,875	67,085	76·52
	Pay	2,057,310	1,867,132	186,023	4,155	. .	3·41%	3·37%	
Eumundi	Make	2,187,760	2,010,042	177,718	. .	. .	68,237	68,394	91·72
	Pay	2,187,917	2,035,723	151,886	308	. .	3·21%	3·22%	
Pomona	Make	1,380,688	1,294,976	83,881	1,831	. .	29,731	29,201	93·41
	Pay	1,380,158	1,331,029	48,095	1,034	. .	2·20%	2·16%	
Chinchilla	Make	1,697,943	889,751	524,608	268,912	14,672	39,488	42,610	95·41
	Pay	1,701,065	930,641	547,602	213,052	9,770	2·38%	2·56%	
Daintree	Make	103,763	103,670	93	. .	. .	2,573	2,565	. .
	Pay	103,755	102,615	1,140	. .	. .	2·54%	2·53%	
Dayboro'	Make	74,098	. .	74,098	. .	. .	. .	. .	. .
	Pay	. .	. .	. .	. .	. .	. .	. .	. .
Toowoomba	Make	2,284,725	1,534,325	621,992	128,408	. .	74,691	74,664	49·69
	Pay	2,284,698	1,540,004	618,672	126,022	. .	3·37%	3·37%	
Clifton	Make	1,207,528	637,616	543,592	26,320	. .	30,889	30,915	91·29
	Pay	1,207,554	640,632	544,360	22,562	. .	2·62%	2·62%	
Crow's Nest	Make	1,396,080	1,028,720	298,928	68,432	. .	37,816	37,836	95·78
	Pay	1,396,100	1,030,518	299,061	66,521	. .	2·78%	2·78%	
Dalby	Make	2,924,150	969,862	1,806,784	147,504	. .	84,875	84,897	89·71
	Pay	2,924,172	961,834	1,835,006	127,332	. .	2·98%	2·99%	

OFFICIAL GRADINGS IN BOXES.

Factory.	Boxes Submitted as Choice.	Grading Result.				Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		
		Choice.	First.	Second.	Pastry.		First.	Second.	Pastry.		Second.	Pastry.	Pas. Qual.
Atherton	..	..	..	..	..	..	..	..	..	..	..	..	..
Bushy Creek	..	..	..	..	..	..	..	..	..	..	..	..	..
Caboolture	24,628	21,711 88·15%	2,917 11·84%	..	..	3,486	1,790 51·34%	1,696 48·65%	..	9	9 100%	..	..
Eumundi	32,783	18,423 56·2%	14,360 43·8%	..	..	3,051	2,568 84·16%	483 15·83%	..	..	..	..	..
Pomona	21,484	17,991 83·74%	3,493 16·26%	..	..	1,501	1,261 84·01%	240 15·98%	..	46	46 100%	..	..
Chinchilla	14,213	7,522 52·86%	6,691 47·08%	..	..	9,306	7,990 85·85%	1,316 14·14%	..	4,839	3,353 69·29%	1,486 30·7%	286
Daintree	..	..	..	..	..	..	..	..	..	..	..	..	..
Dayboro'	..	..	..	..	..	..	..	..	..	..	..	..	..
Toowoomba	7,707	7,433 96·44%	274 3·55%	..	..	10,492	10,423 99·34%	69 ·65%	..	2,076	2,067 99·56%	9 ·43%	..
Clifton	9,993	9,667 96·73%	326 3·26%	..	..	9,218	9,203 99·83%	15 ·16%	..	476	476 100%	..	..
Crow's Nest	17,554	11,093 63·19%	6,461 36·8%	..	..	5,284	4,793 90·7%	468 8·85%	23 ·43%	1,041	1,041 100%	..	..
Dalby	13,590	10,857 79·88%	2,709 19·93%	24 ·1%	..	30,742	30,231 98·33%	511 1·66%	..	2,517	2,074 82·39%	443 17·6%	..

PRODUCTION, PAYMENT, AND GRADINGS OF BUTTER IN QUEENSLAND FOR THE YEAR ENDED 30TH JUNE, 1945—*continued.*

Factory.	Manufacture and Payments in Lb.						Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Goombungee	Make	1,754,032	979,048	771,680	3,304	. .	46,217	46,116	98·57
	Pay	1,753,931	979,532	771,611	2,788	. .	2·70%	2·70%	
Jandowae	Make	2,018,464	1,055,376	889,700	73,388	. .	60,613	60,690	94·50
	Pay	2,018,541	1,064,816	883,308	70,417	. .	3·09%	3·09%	
Miles	Make	765,240	79,408	517,048	168,784	. .	26,190	26,146	84·93
	Pay	765,196	79,356	520,496	165,344	. .	3·54%	3·53%	
Esk	Make	2,126,976	993,890	1,004,783	128,303	. .	69,914	69,851	90·48
	Pay	2,126,913	998,182	1,028,048	100,683	. .	3·39%	3·39%	
Evelyn Tableland . .	Make	237,424	237,424	. .	. .	. .	7,870	6,849	. .
	Pay	236,403	236,403	. .	. .	. .	3·42%	2·98%	. .
Gayndah	Make	1,443,213	1,032,341	335,104	75,768	. .	59,830	59,440	66·50
	Pay	1,442,823	1,048,541	327,756	66,526	. .	4·32%	4·29%	
Killarney	Make	1,265,784	578,452	599,020	88,312	. .	30,232	30,234	78·12
	Pay	1,265,786	598,237	588,553	78,996	. .	2·44%	2·44%	
Logan and Albert . .	Make	2,789,917	2,313,475	476,442	. .	. .	120,246	119,956	91·79
	Pay	2,789,627	2,344,585	442,902	2,140	. .	4·5%	4·49%	
Maleny	Make	2,499,824	2,459,784	40,040	. .	. .	82,015	81,105	93·20
	Pay	2,498,914	2,470,501	27,819	594	. .	3·39%	3·35%	
Biggenden	Make	1,725,135	1,322,327	402,808	. .	. .	70,431	71,115	43·17
	Pay	1,725,819	1,367,601	358,218	. .	. .	4·25%	4·29%	
Kingaroy	Make	3,751,817	3,637,633	. .	114,184	. .	137,950	138,525	36·5
	Pay	3,752,392	3,645,392	. .	107,000	. .	3·81%	3·83%	
Mundubbera	Make	2,181,578	1,905,778	192,248	83,552	. .	76,274	76,071	75·94
	Pay	2,181,375	1,951,545	167,515	62,315	. .	3·62%	3·61%	

OFFICIAL GRADINGS IN BOXES—*continued.*

Factory.	Boxes Submitted as Choice.	Grading Result.				Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result		
		Choice.	First.	Second.	Pastry.		First.	Second.	Pastry.		Second.	Pastry.	Pas. Qual.
Goombungee	17,481	15,208 86·99%	2,273 13·0%	..	..	13,294	12,791 96·21%	503 3·78%	..	101	101 100%	..	..
Jandowae	17,686	14,770 83·51%	2,916 16·48%	..	..	14,937	14,617 97·85%	320 2·14%	..	1,442	1,388 96·25%	54 3·74%	..
Miles	413	123 29·78%	290 70·21%	..	..	8,478	7,907 93·26%	571 6·73%	..	2,715	1,954 71·97%	761 28·02%	..
Esk	17,442	15,922 91·28%	1,520 8·71%	..	..	14,817	14,693 99·16%	124 ·83%	..	2,109	2,071 98·19%	38 1·80%	..
Evelyn Tableland ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Gayndah	9,566	7,609 79·54%	1,957 20·45%	..	..	6,221	5,246 84·32%	975 15·67%	..	1,352	1,169 86·46%	183 13·53%	..
Killarney	5,594	4,068 72·72%	1,526 27·27%	..	..	10,666	10,580 99·19%	86 ·80%	..	1,398	1,350 96·56%	48 3·43%	..
Logan and Albert ..	37,554	27,074 72·09%	10,355 27·57%	125 ·33%	..	8,178	6,916 84·56%	1,262 15·43%	..	..	..	..	..
Maleny	40,913	33,839 82·70%	7,074 17·29%	..	..	695	695 100%	..	..	..	..	..	..
Biggenden .. .	6,275	4,210 67·09%	2,065 32·9%	..	..	7,026	5,645 80·34%	1,381 19·65%	..	..	..	..	..
Kingaroy	22,390	21,775 97·25%	615 2·74%	..	..	100	100 100%	..	..	1,970	1,749 88·78%	221 11·21%	..
Mundubbera	24,880	17,020 68·4%	7,811 31·39%	49 ·19%	..	3,427	1,933 56·4%	1,482 43·24%	12 ·35%	1,279	1,093 85·45%	186 14·54%	..

PRODUCTION, PAYMENT, AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1945—*continued.*

Factory.	Manufacture and Payments in Lb.						Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Wondai	Make	2,386,966	1,909,678	413,480	63,808	..	79,841	79,260	54·74
	Pay	2,386,385	1,914,785	428,825	42,775	..	3·46%	3·43%	
Milmerran	Make	1,111,758	181,791	605,472	281,095	43,400	25,593	25,542	84·58
	Pay	1,111,707	244,435	597,335	269,937	..	2·35%	2 ·35%	
Nanango	Make	2,245,011	672,587	1,480,696	91,728	..	74,427	75,919	91·93
	Pay	2,246,503	957,311	1,225,824	63,368	..	3·42%	3·49%	
Oakey	Make	3,842,170	2,759,298	805,784	277,088	..	120,407	124,548	87·08
	Pay	3,846,311	2,802,316	837,027	206,968	..	3·23%	3·34%	
Bundaberg	Make	1,559,769	541,915	1,017,854	..	..	33,064	37,341	24·01
	Pay	1,564,136	550,887	1,010,296	2,953	..	2·16%	2·45%	
Gladstone	Make	913,671	207,991	697,775	7,905	..	20,902	21,918	86·70
	Pay	914,687	196,547	711,756	6,384	..	2·34%	2·45%	
Monto	Make	3,466,564	1,405,752	1,772,742	288,070	..	85,636	86,243	63·85
	Pay	3,467,171	1,429,634	1,797,609	239,928	..	2·53%	2·55%	
Rockhampton	Make	1,224,941	190,123	993,963	38,385	2,470	20,913	24,036	6·35
	Pay	1,228,064	190,920	1,002,004	35,140	..	1·73%	1·99%	
Wowan	Make	1,725,220	434,553	1,251,594	37,303	1,770	42,098	42,974	61·90
	Pay	1,726,096	424,757	1,267,393	33,946	..	2·50%	2·55%	
Biloela	Make	2,811,423	710,384	2,017,849	81,725	1,465	53,425	53,852	48·83
	Pay	2,811,850	697,411	2,048,181	66,258	..	1·93%	1·95%	
Q.A.H.S. and College ..	Make	71,211	41,778	29,433	..	..	1,458	1,457	38·53
	Pay	71,210	67,090	4,066	54	..	2·09%	2·09%	
Boonah	Make	3,258,098	1,882,377	1,209,752	165,969	..	119,159	118,921	86·79
	Pay	3,257,860	2,002,010	1,124,869	130,981	..	3·79%	3·78%	

OFFICIAL GRADINGS IN BOXES—*continued.*

Factory.	Boxes Submitted as Choice.	Grading Result.				Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		
		Choice.	First.	Second.	Pastry.		First.	Second.	Pastry.		Second.	Pastry.	Pas. Qual.
Wondai	14,669	14,005 95·47%	664 4·52	..	..	7,495	6,941 92·6%	554 7·39%	..	1,172	1,065 90·87%	107 9·12%	..
Milmerran	927	765 82·52%	162 17·47%	..	..	10,624	9,780 92·05%	844 7·94%	..	4,869	4,358 89·5%	511 10·49%	373
Nanango	9,802	8,378 85·47%	1,424 14·52%	..	..	25,508	25,060 98·24%	448 1·75%	..	1,548	1,389 89·5%	159 10·27%	..
Oakey	41,804	25,672 61·41%	16,132 38·58%	..	..	13,079	12,345 94·38%	734 5·61%	..	4,879	4,839 99·18%	40 ·81%	..
Bundaberg	363	343 94·49%	20 5·5%	..	..	6,326	6,232 98·51%	94 1·48%	..	..	..	..	..
Gladstone	911	875 96·04%	36 3·95%	..	..	13,036	13,036 100%	..	..	199	42 21·1%	157 78·89%	..
Monto	11,026	10,951 99·31%	75 ·68%	..	..	23,469	23,469 100%	..	..	5,031	5,031 100%	..	..
Rockhampton	..	..	..	..	..	237	237 100%	..	..	452	452 100%	..	351
Wowan	2,688	2,688 100%	..	..	..	15,186	15,186 100%	..	..	943	903 95·75%	40 4·25%	127
Biloela	4,433	3,657 82·49%	776 17·5%	..	..	18,381	18,311 99·61%	70 ·38%	..	1,157	1,079 93·25%	78 6·74%	274
Q.A.H.S. and College ..	..	..	..	..	..	490	446 91·02%	44 8·97%	..	..	..	..	..
Boonah	27,048	13,447 49·71%	13,601 50·28%	..	..	18,925	18,336 96·88%	589 3·11%	..	2,677	2,448 91·44%	229 8·55%	..

PRODUCTION PAYMENT AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1944—*continued.*

Factory.	Manufacture and Payments in Lb.						Over-run.		Make Graded.
	Total.		Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Booval	Make	2,869,887	1,808,074	828,588	233,001	224	106,810	108,483	65·48
	Pay	2,871,560	1,609,433	1,053,255	208,872	..	3·86%	3·92%	
Grantham	Make	2,130,386	1,066,131	884,483	179,772	..	77,416	77,460	92·66
	Pay	2,130,430	1,105,675	872,748	152,007	..	3·77%	3·77%	
Laidley	Make	1,693,309	1,184,866	451,949	56,494	..	57,801	57,746	94·24
	Pay	1,693,254	1,216,373	427,680	49,201	..	3·53%	3·53%	
Lowood	Make	733,725	288,058	409,459	36,208	..	25,626	25,659	92·65
	Pay	733,758	298,146	403,543	32,069	..	3·61%	3·62%	
Roma	Make	651,630	20,258	421,316	210,056	..	27,546	27,546	47·16
	Pay	651,630	151,497	318,968	181,165	..	4·41%	4·41%	
Murgon	Make	2,299,617	1,463,313	832,440	3,864	..	63,267	63,248	78·82
	Pay	2,299,598	1,849,757	447,085	2,756	..	2·82%	2·82%	
Proston	Make	1,238,988	768,420	416,808	53,760	..	38,594	38,307	98·11
	Pay	1,238,701	811,715	382,997	43,989	..	3·21%	3·19%	
Kingston	Make	4,036,368	2,474,472	1,440,880	121,016	..	148,254	148,313	95·58
	Pay	4,036,427	2,619,410	1,330,654	86,363	..	3·81%	3·81%	
Woodford	Make	1,586,737	1,447,313	139,424	..	..	43,178	43,151	95·98
	Pay	1,586,710	1,445,272	141,438	..	..	2·79%	2·79%	
Allora	Make	1,459,143	981,494	471,807	5,842	..	40,849	44,176	85·29
	Pay	1,462,470	990,281	463,323	8,866	..	2·88%	3·11%	
Inglewood	Make	418,412	133,596	236,320	48,496	..	14,121	13,982	82·47
	Pay	418,273	119,466	252,667	46,140	..	3·49%	3·45%	
Mill Hill	Make	1,695,698	1,198,978	341,880	154,784	56	50,612	46,001	53·23
	Pay	1,691,087	947,219	618,171	125,697	..	3·07%	2·79%	

OFFICIAL GRADINGS IN BOXES—*continued.*

Factory.	Boxes Submitted as Choice.	Grading Result.				Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		
		Choice.	First.	Second.	Pastry.		First.	Second.	Pastry.		Second.	Pastry.	Pas. Qual.
Booval	14,366	8,145 56·69%	6,221 43·3%	..	..	15,183	14,787 97·39%	396 2·6%	..	4,013	3,682 91·75%	331 8·24%	..
Grantham	17,235	9,484 55·02%	7,751 44·97%	..	..	15,350	14,899 97·06%	451 2·93%	..	2,667	2,589 97·07%	78 2·92%	..
Laidley	19,638	14,413 73·39%	5,225 26·6%	..	..	7,853	7,189 91·54%	664 8·45%	..	1,005	854 84·97%	151 15 02%	..
Lowood	4,339	3,236 74·57%	1,103 25·42%	..	..	7,191	6,887 95·77%	304 4·22%	..	610	514 84·26%	96 15·73%	..
Roma	..	..	..	..	..	1,771	1,771 100%	..	..	3,717	3,574 96·15%	143 3·84%	..
Murgon	17,929	11,924 66·5%	5,971 33·3%	34 ·18%	..	14,370	14,059 97·83%	311 2·16%	..	69	45 65·21%	24 34·78%	..
Proston	13,404	8,032 59·92%	5,342 39·85%	30 ·22%	..	7,356	6,993 95·06%	363 4·93%	..	938	854 91·04%	84 8·95%	..
Kingston	42,114	32,681 77·6%	9,433 22·39%	..	..	24,464	24,302 99·33%	162 ·66%	..	2,316	2,301 99·35%	15 ·64%	..
Woodford	24,770	13,260 53·53%	11,510 46·46%	..	..	2,426	2,001 82·48%	425 17·51%	..	..	..	..	..
Allora	13,748	8,574 62·36%	5,174 37·63%	..	..	8,372	8,013 95·71%	359 4·28%	..	104	100 96·15%	4 3·84%	..
Inglewood	1,179	678 57·5%	489 41·47%	12 1·01%	..	4,118	3,884 94·31%	234 5·68%	..	865	776 89·71%	89 10·28%	..
Mill Hill	7,229	5,562 78·18%	1,557 21·81%	..	..	6,126	5,884 96·04%	242 3·95%	..	2,766	2,660 96·16%	106 3·83%	..

PRODUCTION, PAYMENT, AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1945—*continued.*

Factory.	Manufacture and Payments in Lb.						Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Texas	Make	148,985	101,992	31,136	15,857	..	5,231	5,220	30·85
	Pay	148,974	98,211	36,186	14,577	..	3·63%	3·63%	
Cooroy	Make	1,625,628	1,222,484	394,016	9,128	..	48,726	48,289	94·38
	Pay	1,625,191	1,310,176	310,555	4,460	..	3·08%	3·06%	
Gympie	Make	6,600,799	5,926,605	570,192	104,002	..	219,189	217,936	92·07
	Pay	6,599,546	6,064,044	453,553	81,949	..	3·43%	3·41%	
Maryborough	Make	885,267	560,094	302,213	22,960	..	30,888	27,265	..
	Pay	881,644	601,416	261,964	18,264	..	3·61%	3·19%	

No butter submitted for grading from this factory.

OFFICIAL GRADINGS IN BOXES—*continued.*

Factory.	Boxes Submitted as Choice.	Grading Result.				Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		
		Choice.	First.	Second.	Pastry.		First.	Second.	Pastry.		Second.	Pastry.	Pas. Qual.
Texas	..	..	..	..	..	539	456 84·6%	83 15·39%	..	282	155 54·96%	127 45·03%	..
Cooroy	20,560	16,442 79·97%	3,910 19·01%	208 1·01%	..	6,696	6,442 96·2%	254 3·79%	..	143	124 86·71%	19 13·28%	..
Gympie	97,391	91,502 93·95%	5,889 6·04%	..	..	9,553	7,199 75·35%	2,264 23·69%	90 ·94%	1,587	1,079 67·98%	508 32·01%	..
Maryborough	..	..	..	..	..	..	..	..	..	..	..	..	..

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which qualified for entry into the Advanced Register of the Herd Books of the A.I.S., Jersey, Guernsey and Ayrshire Societies, production records for which have been complied during the month of November, 1945, (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Silver Glen Opal	V. R. Nugent, Murgon	9,172·45	329·634	Aynsley Renell
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Tara Hilda 2nd	Mrs. K. Henry, Watt's Siding	7,577·25	290·982	Murray's Bridge Pansy's Gift
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Yarranvale Phyllis	W. Henschell, Yarranlea	8,002·43	321·119	Trevor Hill Bosca
JUNIOR, 2 YEARS (STANDARD, 230 LB.)				
Tabbagong Lucy 20th	J. Crookey, Allora	8,324·34	348·662	Parkview Paymaster
Tabbagong Pet 4th	J. Crookey, Allora	8,336·81	324·585	Parkview Ensign
JERSEY.				
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Navua Desired Sunshine	F. Eager, Petrie	4,409·5	303·588	Majestic
Gem Constance (228 days)	W. Bishop, Kenmore	5,871·2	294·191	Bulby Oxford Gamboge
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Glenrandle Hazeldale	P. Kerlin, Killarney	5,384·6	345·157	Bellgarth Stylish
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Strathdean Sparkle	S. H. Caldwell, Bell	7,056·46	359·102	Oxford King's Victor
Strathdean Tassie	S. H. Caldwell, Bell	6,402·09	334·424	Strathdean Tarzan
Glenrandle Fashion Lady	P. Kerlin, Killarney	5,520·0	314·393	Bellgarth Stylish
Glenrandle Alfa	P. Kerlin, Killarney	5,346·4	296·921	Bellgarth Stylish
GUERNSEY.				
SENIOR, 4 YEARS (STANDARD 330 LB.).				
Mirabels Patch	W. A. Cooke, Maleny	7,621·12	410·412	Laureldale President
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Laureldale Vera	W. A. K. Cooke, Maleny	9,599·2	476·161	Minnamurra Topsy Sequel 2nd
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Laureldale Buttermaid	W .A. K. Cooke, Maleny	6,482·95	346·846	Minnamurra Topsy Sequel 2nd
AYRSHIRE.				
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Leafmore Miss Bell	J. P. Ruhle, Motley	6,699·51	258·573	Myola Bessemer

Plate 3.
WOOROOLIN DAIRY LANDS, SOUTH BURNETT.

Plate 4.
A WHEATLAND MILO SORGHUM CROP, KINGAROY DISTRICT.

The PIG FARM

Parasitic Diseases of the Pig.

F. H. S. ROBERTS, Division of Animal Industry.

MANY farmers have the idea that the pig prefers to live under filthy conditions. This belief is by no means uncommon and is seen in the frequency with which deplorable conditions of housing and feeding are encountered in this State. Sties with earthen floors, deep in a mixture of mud, dung, and litter, and food thrown on the ground or fed from troughs, which are rarely cleaned, are expected to produce healthy profitable animals.

Filth goes hand in hand with disease, and no disease is more favoured by insanitary conditions than that associated with parasites. Under these circumstances, parasites thrive, because favourable conditions are created for the development and survival of the eggs and larvae and access to the pig is made easy when food is thrown on the ground or fed from dirty troughs.

Plate 5.

These Four Pigs are from the Same Litter.—The two larger animals are worm-free; the two smaller animals are infested with worms.

Unlike diseases caused by bacteria and viruses, parasitic diseases are rarely spectacular in their onset, and are, therefore, apt to be overlooked. Infested pigs may never show any marked symptoms of infestation and yet fail to make profitable weight gains. The ill-effects that occur are, as a rule, gradually accumulative and the animal, if it survives, finally becomes stunted and unthrifty (Plate 5). Such pigs may take a year and more to attain a marketable weight, despite treatment and any improvement in housing and feeding.

Furthermore, as a result of infestation the resistance of the animals to other diseases is considerably reduced. A high percentage of the losses which occur among suckling pigs is due either directly to parasitism or to other diseases which find the baby pig a suitable host because its vitality has been undermined by parasites.

In bacon factories and abattoirs, heavy losses are experienced by the condemnation of carcases and organs, which have been rendered unfit for human consumption because of parasites. Whole carcases, or parts thereof, may be condemned because of parasitic mange or extensive kidney worm infestation. No less than 60 to 70 per cent. of livers are condemned because of damage caused by the larvae of the large roundworm and kidney worm (Plate 6). The latter parasite also renders a large number of kidneys unfit for consumption.

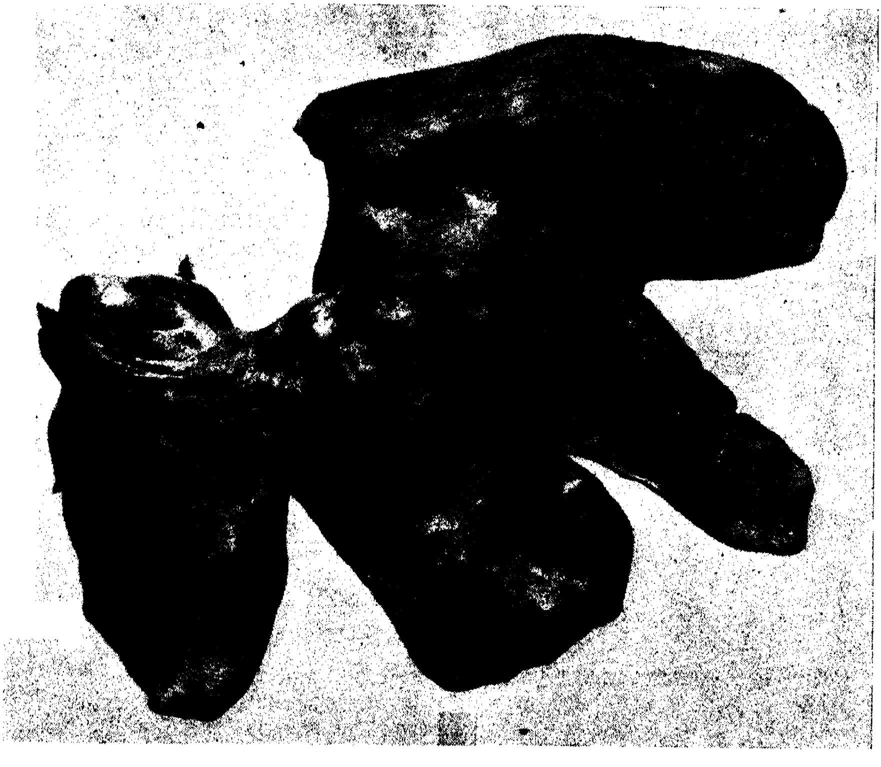


Plate 6.

THIS LIVER IS ONE OF THE MANY THOUSANDS CONDEMNED EVERY YEAR BECAUSE PARASITES HAVE RENDERED IT UNFIT FOR HUMAN CONSUMPTION.

These losses amount to many thousands of pounds annually, and it all comes out of the farmer's pocket. The Division of Animal Industry can show him how to avoid these losses, but the actual practice of the Division's recommendations is the farmer's own responsibility. Control is not a difficult procedure nor are the measures advised in any way impracticable.

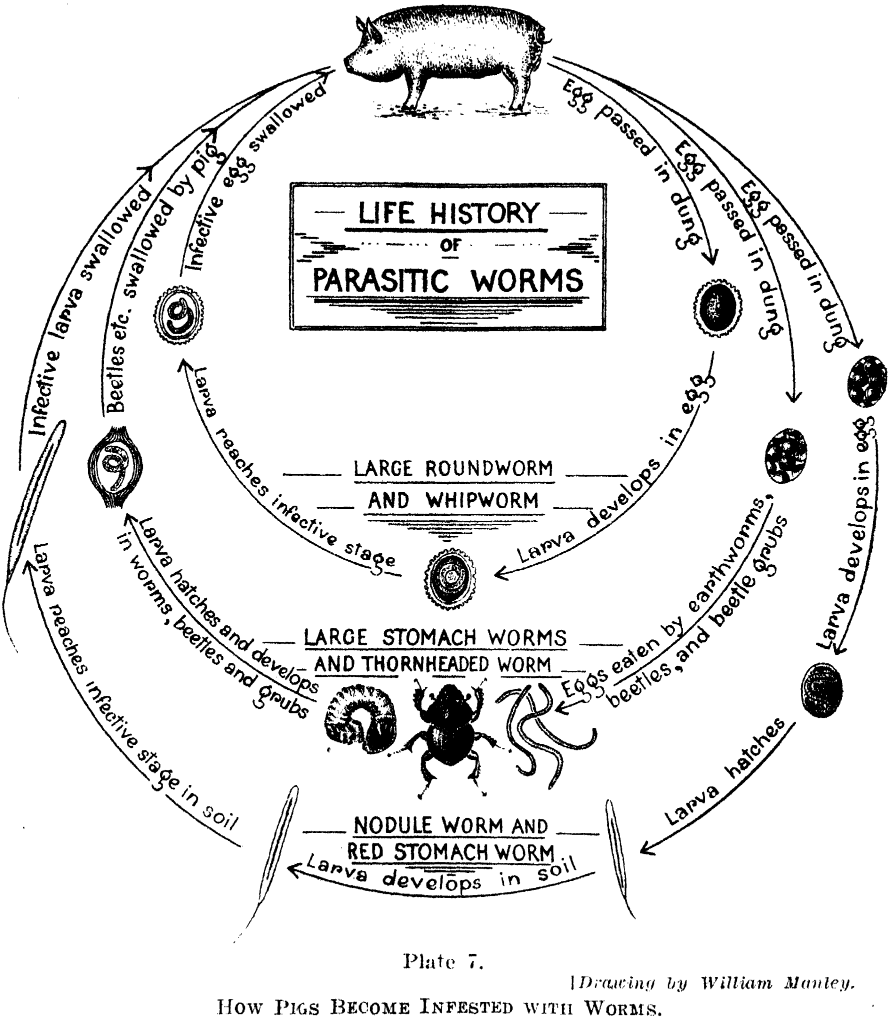

LIFE HISTORY OF PARASITIC WORMS
Infective larva swallowed
Beetles etc. swallowed by pig
Infective egg swallowed
Egg passed in dung
Egg passed in dung
Egg passed in dung
Larva develops in egg
Larva reaches infective stage
LARGE ROUNDWORM AND WHIPWORM
Larva develops in egg
Larva hatches and develops in worms, beetles and grubs
LARGE STOMACH WORMS AND THORNHEADED WORM
Eggs eaten by earthworms, beetles, and beetle grubs
Larva reaches infective stage in soil
Larva hatches
NODULE WORM AND RED STOMACH WORM
Larva develops in soil

Plate 7.

[*Drawing by William Manley.*

HOW PIGS BECOME INFESTED WITH WORMS.

WORM PARASITES.

How Pigs Become Infested with Worms (Plate 7).

Unlike other disease agents, such as bacteria, worms do not reproduce within the host animal. Each individual worm represents an egg or larva picked up from the soil by the animal, usually in its food or water. Each female worm in the animal lays eggs which are carried to the exterior in the dung or, in the case of the kidney worm, in the urine. Thereafter, depending on the species of worm, development proceeds in one of the following ways:—

1. In some species a larval worm develops inside the egg. In time, the larva reaches what is termed "the infective stage." Only eggs containing infective larvae are capable of setting up an infestation. When swallowed, the egg hatches and the larva is set free and grows to maturity, when it commences to lay eggs. The large roundworm is picked up in this manner.
2. In other species the larva, after developing in the egg, hatches and lives in the soil. It feeds and grows in the soil and ultimately reaches the infective stage. Such larvae gain access to the pig when swallowed with food or water, as is the case with the nodule worm, or as with the kidney worm, they can bore through the skin.
3. Other species require the assistance of an intermediate host before they can complete their development. In the case of the pig, earthworms, dung beetles, and certain beetle grubs fill this role. The egg is eaten by the earthworm, beetles, or beetle grubs and in these the larvae develop and reach the infective stage. When the intermediate hosts containing infective larvae are eaten by the pig the larvae are set free in the pig, and grow to the adult stage.

Symptoms of Parasitic Disease.

In the early stages of parasitic disease, symptoms are not usually very prominent, and the only evidence of infestation may be that the animals fail to "do well." As the disease progresses other symptoms are observed, such as marked loss of condition, a capricious appetite, colic, diarrhoea or constipation, vomiting, coughing and laboured breathing, and sometimes nervous disorders like convulsions. The final result is an anaemic, weak, stunted animal with a dry, harsh coat and dull, sunken eyes.

Detection of Worm Parasites.

A few worms do little harm and it is only when numbers of worms are present that one is justified in holding them responsible for any symptoms that may indicate parasitism. A long experience with parasitic diseases is, then, essential before a diagnosis can be made with any accuracy. For this reason the local Veterinary Officer, Adviser in Pig Raising, or Stock Inspector should be consulted. If these officers are not available, the following steps are advised:—

1. Fresh dung samples from at least five animals should be tightly packed in separate containers made as airtight as possible. In the laboratory it is possible to find the eggs and to determine not only which species of worms are present, but also the degree of infestation.
2. Better still, kill one of the affected animals and forward the entire viscera—that is, the stomach and intestines and lungs—in a petrol tin. The viscera should be preserved in formalin (1 oz. of commercial formalin to 1 pint of water). If formalin cannot be obtained and the farm is close to the laboratory, the viscera could be liberally sprinkled with coarse salt.

3. Specimens of dung or viscera should be sent to the Animal Health Station, Yeerongpilly, Brisbane, or the Animal Health Station, Oonoonba, Townsville. Each specimen should be accompanied by particulars giving full details as to—
   - (*a*) how many pigs are affected;
   - (*b*) number of deaths;
   - (*c*) symptoms;
   - (*d*) ration fed; and
   - (*e*) condition of housing and of pastures.

Frequently, in the case of the large roundworm, worms are passed in the dung or are vomited. The number seen at any one time and the frequency with which the worms are passed sometimes give an indication of the cause if the animals tend to be unthrifty.

Control.

Treatment.

No matter how efficient, treatment should always be considered as giving only temporary relief. It is of little benefit to remove worms from animals which are maintained in an environment in which reinfestation can rapidly occur. Furthermore, treatment is of no value against the kidney worm or the larvae of the large roundworm when they are migrating through the body.

There are many remedies claimed to be effective in removing worms and, frequently, the farmer is satisfied with results if he sees worms passed after treatment. It must be remembered, however, that a treated animal might pass, say, 20 worms, and still be infested by 200. It is not, then, the number of worms that are passed which proves the efficiency of any drug, but the number which the drug fails to remove. The drugs mentioned here, namely, carbon bisulphide, oil of chenopodium and phenothiazine, have all been thoroughly tested and are known to be effective, and, at the dose rates recommended, comparatively safe.

All these drugs are poisons. If there is any carelessness in measuring the dose or in administration, the animal may die. To avoid this possibility, the following points should be carefully considered:—

1. Use only the recommended dosages and carefully measure them in a glass measuring cylinder. If this cannot be obtained, the following measures may be used:—

   1 teaspoonful = 3½ cubic centimetres
   1 dessertspoonful = 7 cubic centimetres
   1 tablespoonful = 14 cubic centimetres
   1 beer bottle = 26 fluid ounces

2. The dose should be reduced by one-quarter to one-half for very weak or sick animals.

3. Divide the pigs, as far as possible, into groups according to their weight. Bulk quantities of the drug can then be prepared for each weight group.

Methods of Treatment.

Worm remedies may be given (a) in capsules, (b) as a drench, (c) by stomach tube or, (d) mixed with the food.

Capsules.—Gelatine capsules are filled with the measured dose. They are held in a special pair of capsule forceps and are passed into the throat, the mouth being held open by a gag or spreader. Carbon bisulphide is given in this manner.

Drench.—The mouth is held open with a gag and the drug is delivered over the back of the tongue by a drenching syringe. Special syringes for drenching pigs are, unfortunately, not available. Syringes for dosing sheep with phenothiazine can be used. It is advisable to lengthen the nozzle by attaching a piece of stout rubber tubing about 6 inches in length. Oil of chenopodium in castor oil, and watery suspensions of phenothiazine, are given as drenches.

Stomach Tube.—This is the safest way of treatment, but requires a good deal of experience. The stomach tube, which is made of special rubber hose, is passed through the gag, down the throat and into the stomach. The drug is poured into the tube through a small funnel or by means of a syringe attached to the tube. Carbon bisulphide, oil of chenopodium and castor oil, and suspensions of phenothiazine may be administered by stomach tube.

Mixed with Food.—This is the most convenient way of administering treatment. The drug is mixed with a small amount of food and then placed before the animal, which has previously been starved. Such treated food may be distasteful and the animal, as a rule, has to be very hungry before it will eat it. It is frequently recommended for treating groups of pigs at the one time. Owing, however, to the fact that under such conditions some animals will eat more than others, some may get an overdose of the drug and others not enough to be beneficial. The dose can be controlled better if the method is applied to individual animals. Phenothiazine is the only drug recommended to be given in the food.

Great care must always be exercised when administering these drugs, for in inexperienced hands it is very easy to deliver the drug into the windpipe, instead of the throat, and kill the animal. Pigs resent handling and the continuous squealing is a hazard which has to be watched very carefully, as it exposes the entrance into the windpipe and lungs. Capsules can quite easily be delivered into the windpipe or they may break and the drug may "go down the wrong way."

Young animals are set up on their tail and held firmly with the assistant's legs grasping the body and his hands holding the ears or forelegs. The mouth is opened with a gag. With capsules, the capsule is held securely in the capsule forceps which are passed through the gag and over the back of the tongue into the throat. The capsule is then released. Liquid drenches are delivered slowly and in small quantities over the back of the tongue, allowing the animal its own time to swallow. On no account should attempts be made to hasten swallowing.

Milk Treatment.—Many farmers who feed mainly on skim milk have noticed that animals brought on to this diet may pass large numbers of worms. This has been the subject of a recent investigation in the United States and it was shown that skim milk fed for 3 to 5 days would eliminate the majority of the worms. Protection against infestation can be secured by frequent administration of skim milk in sufficient quantities to cause scouring.

Prevention of Infestation.

The measures devised to prevent infestation are founded upon careful studies of the habits and life histories of the various parasites. The chances of the eggs and larvae developing and surviving depend mainly on adequate moisture, protection from sunlight, and, in some cases, the presence of suitable intermediate hosts.

Therefore, if housing conditions are maintained in such a way that these factors are eliminated as far as possible the chances of infestation are considerably reduced. Under normal farm practice, infestation cannot be entirely eliminated, but, with a little care, it can be reduced to a point where it is no longer harmful.

A practical system of prevention must vary in accordance with the type of husbandry employed, but the following principles apply equally well to all types of husbandry as they simply embody the main principles of good sanitation:—

1. *Housing.*—All housing should be well constructed so as to enable thorough cleansing. Concrete or well-built wooden floors are essential. Earthen floors can never be kept clean.
2. *Dung.*—Dung should be regularly and frequently removed. If desired for fertilizing purposes, it should be used only on those pastures not accessible to pigs. Otherwise it should be destroyed by burning or deep burial. Pig dung is a favoured breeding medium for the house fly, which can be not only a serious annoyance but also a major factor in the spread of disease.
3. *Drainage.*—A good drainage system to keep the sties and pastures and yards as dry as possible is necessary for good sanitation. All depressions should be filled in and mud holes eliminated. Wallows, if considered necessary, should be built of concrete and regularly cleaned out and disinfected.
4. *Feeding.*—Food should never be thrown on the ground but fed from concrete troughs built to prevent the animals climbing into them and lying in the food. Such food troughs should be surrounded with a concrete or wooden platform raised above the surface of the ground and sloping away from the trough. Troughs and platforms must be kept clean. Dry food is best fed from hoppers.

   A good balanced ration should be available. This increases the animal's resistance to infestation. It has been shown, for example, that young pigs are more susceptible to infestation when the sow's milk supply is inadequate. The farmer who feeds garbage should pay strict attention to the cleanliness of the boiler.

5. The runways and yards should be kept free of all litter. An accumulation of litter prevents the soil from drying and provides favourable conditions for the development and survival of eggs and larvae.

Losses from parasitic diseases are most frequent among young pigs, for the young animals are more susceptible to infestation. Particular efforts should then be made to provide protection for the young animals. A system of management which has produced excellent results in the United States is well worthy of consideration. The main features of this system are:—

(1) The farrowing pen should be of sanitary construction. Just prior to housing the sow, the pen should be thoroughly cleansed with boiling disinfectant (5 per cent.). The sow is washed with warm soapy water and all dirt and mud crusts removed, particular attention being given the feet and udder. It is advisable to treat the sow before she is placed in the pen. This can be done quite safely with phenothiazine given in a small quantity of food (see page 35).

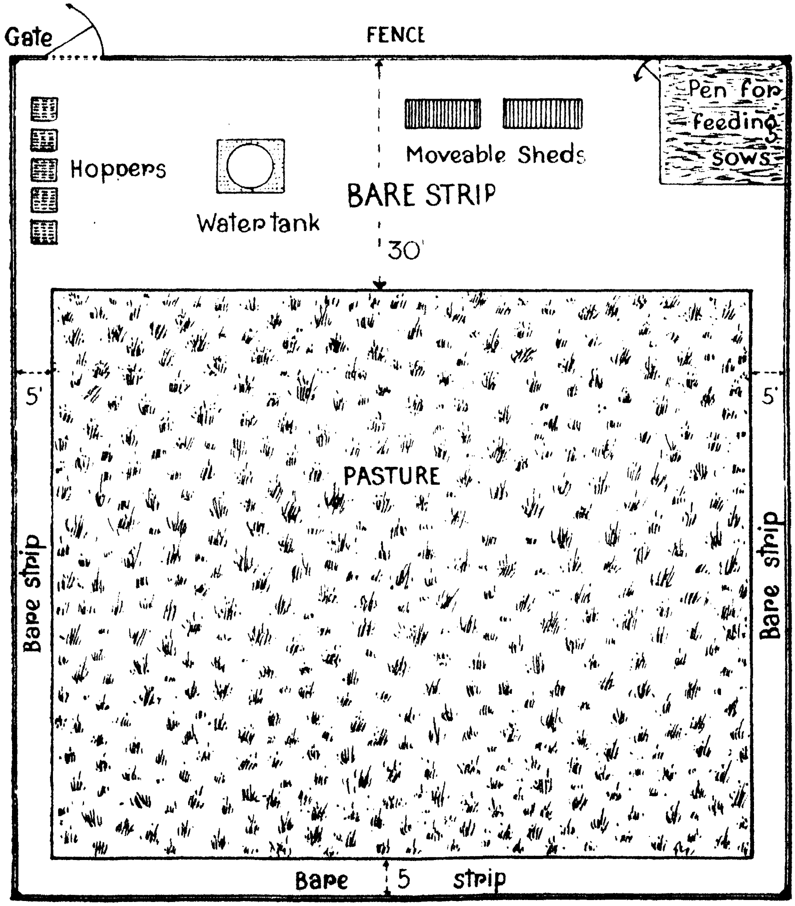


Plate 8.

PLAN OF A PASTURE FOR RUNNING SOWS AND YOUNG PIGS TO PREVENT INFESTATION.

From Farmer's Bulletin, 1787, U.S. Department of Agriculture.

[Drawing by William Manley.

(2) A few days after birth, the sow and pigs are removed to a well-drained pasture, sown with a suitable forage crop. It is best to use temporary pastures, each pasture being spelled for at least one year. Around three sides of the pasture, a bare strip 5 ft. in width, and on the fourth side, a bare strip 30 ft. in width, should be provided. Portable shelter sheds, food and watering troughs are placed close to the fence on the 30 ft. bare strip. The sow should be fed away from the youngsters (Plate 8). It is essential that all bare strips be kept clean of weed growth and litter. Most of the urine and dung is passed on the bare areas, particularly around the feeding troughs. The action of the sun and the rapid drying of the dung and urine as the moisture is absorbed into the dry soil quickly kill the eggs and larvae.

(3) On weaning, the young pigs are transferred to another temporary pasture and maintained here until ready for market.

On farms where no such pasture land is available the farmer is advised to remove the top 9 to 12 inches of the old contaminated soil in the yard attached to the pen and replace with fresh soil, preferably sand. Only the young pigs should use this yard, exits from the pen being too small for the sow to pass through.

Types of Worms.

Eighteen different kinds of worms are known to attack pigs in Queensland. They comprise flukes, tapeworms, and roundworms. Fortunately, some of these occur in small numbers and are not of any economic importance.

Flukes.

These are usually flattened and leaf-like. In some countries fluke infestation is very serious, but in this State the only species seen is the liver fluke, *Fasciola hepatica*, which is comparatively rare.

Tapeworms.

The pig does not harbour any adult tapeworms, but acts as an intermediate host for two species, which reach maturity in the dog. *Cysticercus tenuicollis* is the larval form of *Taenia hydatigena*. It has the appearance of a bladder of fluid which, in the pig, occurs in the liver or attached to the webbing that holds the intestines (the mesentery). It is of no economic importance.

Echinococcus granulosus, on the other hand, is a very important larval tapeworm, as it is the cause of hydatids, which is a serious disease in man. The larval hydatid is found principally in the liver and lungs of the sheep, cow, pig, and other animals and consists of a bladder of fluid containing numerous minute white specks. These larvae, if eaten by a dog, grow into the adult tapeworm, *Taenia echinococcus*. The eggs are passed in the excreta of the dog and may be accidentally swallowed by man. Every effort should be made to prevent dogs from becoming infested through eating offal containing the larval forms. This can be done by boiling all such offal thoroughly if it is to be fed to dogs.

Roundworms.

Stomach Worms.

Three species of worms are found in the stomach. When in small numbers they are difficult to find because they are closely associated with the wall of the stomach and are covered with a slimy mucous.

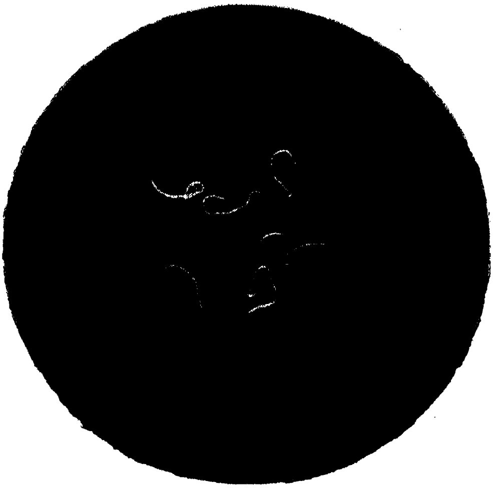


Plate 9.
THE LARGE STOMACH WORM, *Ascarops strongylina*. (Natural size).

Life History.—*Ascarops strongylina* (Plate 9) and *Physocephala sexalatus* are comparatively large worms, measuring up to about an inch in length. They are white to pink in colour. Both these species use dung beetles as intermediate hosts. The eggs, passed in the dung, are eaten by these beetles. The larvae on hatching from the eggs develop to the infective stage in the beetle. The pig becomes infested when it eats these insects.

The third species is *Hyostrongylus rubidus*, the red stomach worm (Plate 10). These worms are small and delicate, being no more than

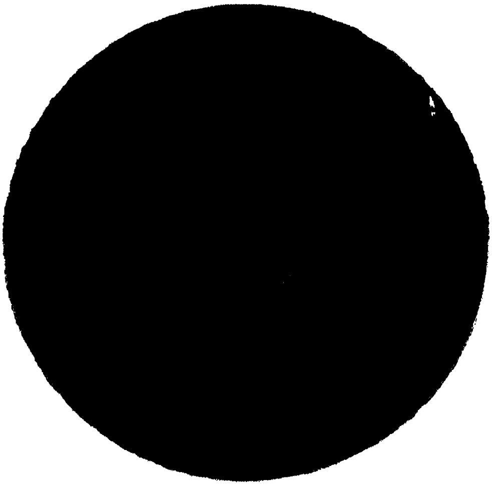


Plate 10.
THE RED STOMACH WORM, *Hyostrongylus rubidus.* (Natural size.)

one-third of an inch in length. The eggs of the red stomach worm are passed in the dung. The larva, which develops in the egg, hatches and is free living in the soil. It eventually reaches the infective stage and when swallowed by the pig in food or water becomes mature in about 2½ weeks.

Effect on the Pig.—As a result of infestation the wall of the stomach may be seriously damaged. It becomes inflamed, sometimes ulcerated, and is covered with a thick slimy mucous. Heavy infestations cause rapid loss of condition and may ultimately be fatal.

In this State, the red stomach worm is the most serious species. It is very prevalent in the northern pig-raising districts, where it is responsible for severe losses.

Control.—Carbon bisulphide is recommended for the removal of stomach worms. Pigs are starved for 18-24 hours before and for 3-4 hours after treatment. The drug is given either in capsules or by stomach tube. The dose rate is 8 to 10 cubic centimetres for a 100-lb. pig.

Carbon bisulphide sometimes causes vomiting, dizziness, and prostration, but as a rule these ill-effects are only temporary.

Infestation may be controlled by putting into operation the measures discussed on pp. 34 to 38. The eggs are larvae of the red stomach worm have little resistance to dryness or exposure to sunlight. Dung beetles can be controlled only when the source of infection, namely the dung, is dealt with.

Intestinal Thread Worms (*Strongyloides ransomi*).

These are very tiny, thread-like worms measuring about one-sixth of an inch in length. They are found in the small intestine. Special laboratory methods are necessary to find them as they are too small to be seen on casual examination.

Life History.—The eggs are passed in the dung and under favourable conditions of temperature and moisture hatch in a few hours. The larvae may develop to the infective stage, or they may grow into adult male and female worms which live free in the soil. These free-living females produce eggs which may develop to the infective stage also, or they may produce further free-living adults. The infective larvae gain access to the pig either in food or water or else by boring through the skin.

Effect on Pig.—Infestation is acquired very early in the life of the pig. Threadworms are extremely common parasites and heavy infestations are prevalent. Diarrhoea and loss of condition are the most pronounced symptoms. Young pigs may be seriously affected. The wall of the intestine is damaged and bacteria may enter the body from the intestine, with serious consequences.

Treatment and Control.—No efficient treatment is known for these tiny parasites, so preventive measures become of the highest importance in keeping the young pigs free (see page 34).

The Large Roundworm (*Ascaris lumbricoides*). (Plate 11.)

This parasite, which occurs in the small intestine, is one of the largest roundworms known. It may attain a length of 15 inches and the thickness of a lead pencil.

Life History.—The eggs laid by the female worms pass out in the dung, and under suitable conditions of temperature and moisture become infective in about 18 days. These infective eggs when swallowed

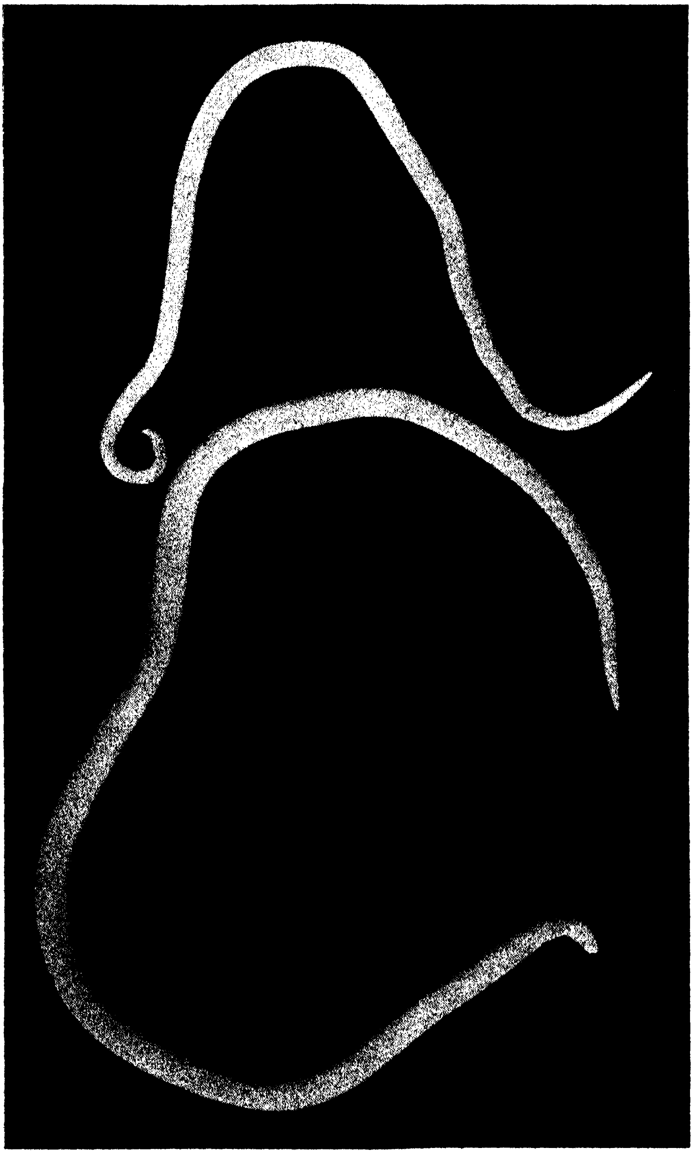


Plate 11.

THE LARGE ROUNDWORM, *Ascaris lumbricoides*. (Natural size.) The male is smaller than the female and has a curled tail.

by the pig hatch and set free the young larvae which immediately bore into the intestinal wall. From there they are carried in the blood stream to the liver. Continuing their migration, the larvae reach the blood capillaries, and are moved on to the heart, and from there to the lungs. About ten days after hatching, the larvae leave the lungs, move up the windpipe into the mouth, are swallowed, and reach the small intestine again. They now settle down and grow to maturity in about two months.

Effect on the Pig.—The large roundworm is the most common and most harmful parasite of pigs in Queensland. It occurs in all the pig-raising districts and the success or otherwise of many pig-raising enterprises depends largely on its control.

Young pigs up to four or five months old are most seriously affected. Older pigs are more resistant to the parasite. They may, however, carry the adult worm and constitute a source of infection for the younger animals.

The parasite causes severe damage in the larval stages, when the worms are migrating through the liver and lungs. The liver tissue is destroyed and replaced by useless fibrous material which forms the so-called milk spots in infected livers (Plate 6). In the lungs, the larvae destroy the lung tissue and may cause pneumonia. Pigs which survive may breathe in a laboured and bellows-like way and they may cough frequently. The cough common to many young pigs, which is usually passed off by the farmer as a cold, is largely due to these larvae. The adult worms rob the pig of food and cause obstructions in the intestine. Animals become stunted, with a dry harsh coat giving them a hidebound appearance. Vomiting, diarrhoea, or constipation may be evident. Sometimes nervous disorders occur.

Treatment and Control.—While the large roundworm is most common in young pigs, the importance of treating the sow should not be overlooked. A few worms in a sow do not give rise to any symptoms but are a great danger as a source of eggs to infect the suckers.

Two drugs may be used against this parasite, namely, oil of chenopodium and phenothiazine.

Animals to be treated with oil of chenopodium are starved for 18 to 24 hours before and for 3 to 4 hours after treatment. The drug is given at the rate of 1 cubic centimetre in 1 fluid oz. of castor oil for every 25 lb. of live weight. A pig weighing 100 lb. would receive 4 cubic centimetres of oil of chenopodium in 4 fluid oz. of castor oil. The oil of chenopodium is thoroughly mixed with castor oil and given either with a drenching syringe or by stomach tube.

Phenothiazine is a fine greenish powder, insoluble in water, but capable of being suspended in water and given as a drench. Suspension is improved if the powder is rubbed through a fine sieve to remove all lumps. It is by no means as effective as oil of chenopodium and should be used only when chenopodium is not available. The dose rates are as follows:—

Pigs up to 25 lb. weight	⅛ oz. phenothiazine
Pigs 25 lb. to 50 lb. weight	¼ oz. ”
Pigs 50 lb. to 100 lb. weight	½ oz. ”
Pigs 100 lb. to 200 lb. weight	⅔ oz. ”
Pigs over 200 lb. weight	1 oz. ”

Based on these dose rates, 1 lb. of phenothiazine is sufficient for—

96 pigs up to 25 lb. weight.
64 pigs 25 to 50 lb. weight.
32 pigs 50 to 100 lb. weight.
24 pigs 100 to 200 lb. weight.
16 pigs over 200 lb. weight.

Phenothiazine may be given as a drench suspended in water or it may be mixed with food. In either case, the animals are divided into groups according to their weight. The amount of phenothiazine for each weight group is computed and accurately weighed out.

To be used as a drench.—The bulk quantity of phenothiazine is first rubbed into a paste with a little water. The amount of water is gradually increased, and the mixture stirred until a good even suspension is secured. The amount of water added should be such that animals up to 25 lb. weight receive ½ fluid oz. of the suspension (containing ⅙ oz. phenothiazine) and animals over 200 lb. 2 fluid oz. (containing 1 oz. phenothiazine). The suspension is not very lasting and requires frequent stirring. It is advantageous to have one man stirring and one man drenching.

No starvation is required either before or after treatment.

To be given in food.—Treatment with phenothiazine in the food may be adopted for individual animals or it may be employed to treat a group of pigs together. In either case, the animals must be starved for about 24 hours to make them sufficiently hungry to eat the treated food, which the phenothiazine renders somewhat distasteful. The dose is mixed with about four times its weight of pollard or some similar food, which is dampened with water.

Results comparable to drenching with phenothaizine are obtained when individual pigs are treated in this manner, provided all the prepared food is consumed. Efficient results cannot be expected when a number of pigs are treated simultaneously. Some will eat much more than others. Some pigs may not, therefore, receive enough phenothiazine to be effective, whilst others may get an overdose which may cause ill-effects. If the method is adopted, care should be taken that each pig is allowed ample space at the trough.

It would be best to drench all pigs that can be handled. Animals too large to be handled could be confined separately and given a mixture of phenothiazine and food.

For a few days after treatment with phenothiazine the urine is stained red, but this is of little consequence.

Under certain circumstances, at present obscure, ill-effects may follow the use of this powder. In such cases, the pigs may develop a wobbly gait and lose their appetite for varying periods. Sometimes the eyes are affected and skin rashes appear. Some of these ill-effects are thought to be in some way associated with exposure to sunlight.

Prevention of Infestation.—During its lifetime, each female worm lays up to 27,000,000 eggs. These are very resistant to dryness, sunlight, and other adverse conditions and may survive in yards and pastures for at least four years. In time, the soil becomes so heavily contaminated that no young animal can escape infestation. The cycle from the pig to the soil and from the soil to the pig can be broken only by putting into practice the preventive measures discussed on pages 34 to 38. The pasture method of control mentioned on page 37 was originally designed to give protection against the large roundworm and, wherever it has been employed, excellent results have been obtained.

The Thornheaded Worm (*Macracanthorhynchus hirudinaceus*).
(Plate 12.)

The thornheaded worm also occurs in the small intestine, and is a large species, growing up to 16 inches in length. It is white in colour and the head is provided with a thorny proboscis by which the worm attaches itself to the wall of the intestine.

Plate 12.

THORNHEADED WORM, *Macracanthorhynchus hirudinaceus*. (Natural size.)

Life History.—The eggs are passed in the dung. Before further development can proceed the eggs must be eaten by certain beetle grubs. The larva hatches in the grub and develops to the infective stage. The pig when rooting in the soil eats the grubs and so becomes infested.

Effect on the Pig.—The thorny proboscis of this parasite causes a conspicuous wound in the delicate intestinal wall. The worms are continuously moving about and each new attachment produces a fresh wound. Sometimes, the proboscis penetrates so deeply that the wall is pierced. Peritonitis and death are the sequences in such cases. The wounds may be invaded by bacteria and ulcers formed.

Control.—No drug is available for the removal of these parasites. Prevention is therefore of the highest importance (see pages 34 to 38). Measures which will prevent the pig from rooting in the soil to find beetle grubs should be considered.

The Nodule Worms (*Oesophagostomum* spp.). (Plate 13.)

These worms are found in the large intestine. They measure at most about half-an-inch in length and are white to grey in colour. Nodule worms are very common parasites and are distributed throughout all the pig-rearing districts. The name "nodule worm" is derived from the nodules which the immature stages cause in the bowel wall.

Life History.—The eggs reach the exterior in the dung. If conditions are favourable, they hatch in a day or two. The larvae which are set free develop to the infective stage in about a week. These infective larvae are then swallowed by the pig. On reaching the large intestine the larvae burrow into the wall, causing the formation of small nodules. They remain here for varying periods, but eventually break out of the nodules and lie free in the intestine. About two months after being swallowed by the pig the worms commence to lay eggs.

Effect on the Pig.—The damage the larvae cause to the bowel wall when they invade it interferes with its normal movements and functions. The adult worms contribute to these ill-effects and, as a result, heavily infested animals become weak and unthrifty.

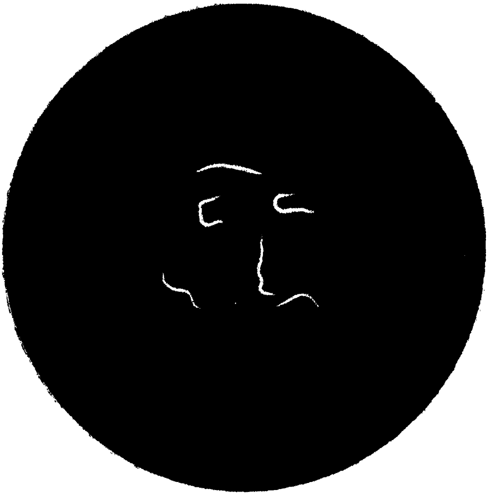


Plate 13.
NODULE WORM, *Oesophagostomum* sp. (Natural size.)

Treatment and Control.—Phenothiazine is the only drug which is effective against nodule worms. It has a high efficiency against this species. The dose rates and methods of administration are the same as those recommended for the large roundworm (see page 42).

Reinfestation is reduced to a minimum when the principles of sanitation are applied (see pages 36, 37).

Whipworm (*Trichuris trichiura*). (Plate 14.)

This parasite gets its common name from its resemblance to a whip, the anterior portion being thin and thread-like, and the posterior portion comparatively stout. It is found in the caecum or blind gut and adjoining portion of the large intestine and may measure from 1½ to 2 inches in length.

Life History.—The eggs laid by the females pass out in the dung, and under suitable conditions of temperature and moisture eventually reach the infective stage. On being swallowed by the pig, these infective eggs hatch, and the young larvae, making their way to the caecum and large intestine, reach maturity in 16 to 20 days.

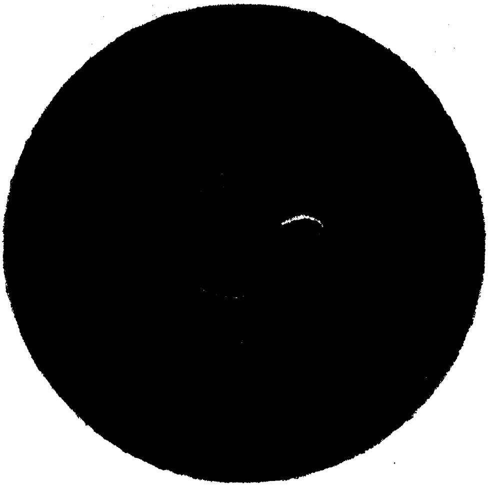


Plate 14.
WHIPWORM, *Trichuris trichiura*. (Natural size.)

Control.—The whipworm is an exceedingly common species, and a heavy infestation is harmful. Repeated treatments with oil of chenopodium or with phenothiazine may give results; but, owing to its location so far back in the alimentary tract, the worm is difficult to reach with vermifuges. The sanitary measures recommended on pages should be applied for whipworm control.

Lungworms (*Metastrongylus* spp.). (Plate 15.)

Two species of lungworms are known—*Metastrongylus apri* and *M. pudendotectus*. Both are thread-like worms from 1½ inch to 3 inches long occurring in the air tubes of the lungs.

Life History.—The eggs when laid by the females contain active embryos which are passed out in the dung. Before its development can be completed the larva, after hatching, must be swallowed by an earthworm, the pig becoming infected when it eats the earthworm.

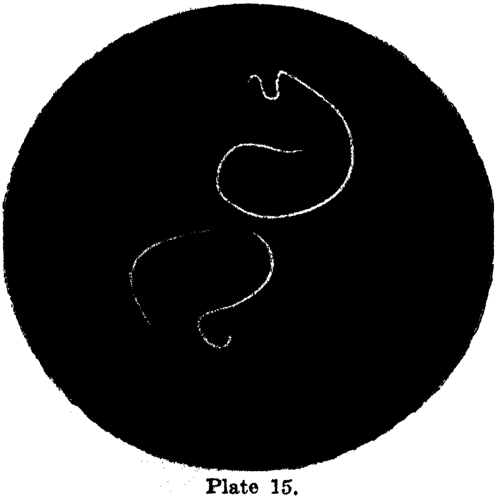


Plate 15.
LUNGWORMS, *Metastrongylus* sp. (Natural size.)

Effect on the Pig.—A light infestation causes no appreciable harm, but when in numbers, and especially in young pigs, the worms may cause a bronchitis characterised by a short, husky cough and laboured breathing. This is sometimes followed by pneumonia. The infested animals rapidly lose condition and, if bacterial complications arise, may die.

Control.—Should an outbreak occur, the affected pigs should be removed and given clean water, nourishing food, and warm quarters. Good nursing is the best treatment for lungworm infestation. All conditions permitting the presence of earthworms must be attended to, and sanitation again is necessary for an efficient control of these parasites.

Kidney Worm (*Stephanurus dentatus*). (Plate 16.)

This parasite is given the popular name of kidney worm because it is found in the vicinity of the kidneys. Mature worms are seen in the flare fat and occasionally in the kidneys themselves, and young stages of the parasite, whilst most prominent in the liver, may occur in the lungs and various other parts of the body. The mature kidney worm has a very distinctive, mottled appearance, is relatively stout, and may grow up to 2 inches in length.

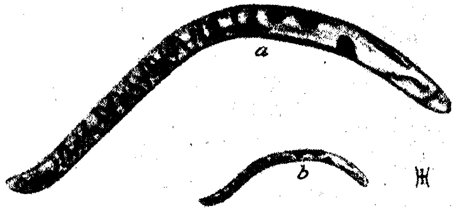


Plate 16.
KIDNEY WORM, *Stephanurus dentatus*.
((*a*) 3 x natural size; (*b*) natural size.)

Life History.—Only those females inhabiting the kidneys or kidney fat are sexually mature, and these lay eggs which eventually reach the exterior in the urine. The eggs hatch in one to two days, and five to eight days after hatching the young larvae are ready to infest the pig. As in the case of the nodule worm, the infective larva is enclosed in a sheath. The pig becomes infested by swallowing these infective larvae, or infection may occur when the larvae burrow through the skin. In either case, the young worm eventually reaches the liver, where it remains for some months. After a period of five or six months the worms are mature and, leaving the liver, migrate to the kidney fat, where, if females, they commence to lay eggs.

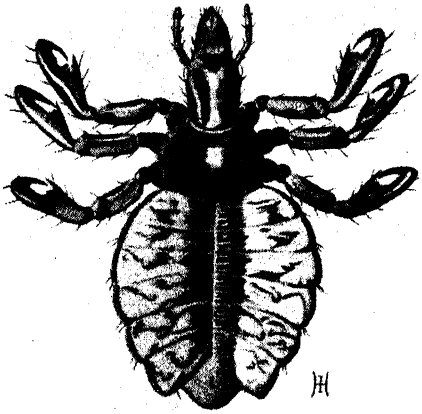
Effect on the Pig.—The kidney worm is one of the most widespread parasites of the pig in Queensland and is a cause of serious wastage. Heavy infestations result in an unthrifty animal, owing mainly to the extensive damage to the liver caused by the young worms. The condemnation of pigs' livers and sometimes of infested carcases, and the unthriftiness of infested pigs, are regarded as among the most serious economic losses in the pig industry in Queensland.

Control.—Owing to their location in the vicinity of the kidneys, these parasites cannot be removed by drugs given through the mouth and preventive measures must be relied on to bring about satisfactory control.

As the eggs and larvae are rapidly killed by sunlight and dryness, yards and sties should be drained thoroughly and kept as dry as possible.

All depressions and mud holes, especially those in the shade, should receive attention. Sties should be built of concrete, and sties and yards must be kept clean.

Good control has been obtained in other countries where the pastures are surrounded by bare strips. Kidney worm eggs and larvae are very susceptible to sunlight and dryness. Urine passed on to dry, bare soil very rapidly dries out and the eggs and larvae are killed. The main feature in kidney worm control is good drainage, which includes elimination of earthen floors, mud holes and depressions in the ground. Yards and sties spelled for six months may be used with safety, as larvae cannot survive for this period.



1

Plate 17.

THE PIG LOUSE, *Haematopinus suis.* (5 x natural size.)

EXTERNAL PARASITES.

The principal external parasites of the pig include lice and mites, the latter being responsible for mange.

Lice (*Haematopinus suis*). (Plate 17.)

Pig lice, *Haematopinus suis,* are found everywhere in Queensland where pigs are raised. The species is one of the largest lice known and may measure up to one-quarter of an inch in length. The mouth parts are constructed in such a way that the louse is able to pierce the skin and suck up blood. This continual puncturing of the skin causes considerable irritation, which in time lowers the vitality of the animal to such a degree as to produce an unthrifty condition and render it more susceptible to attack by other parasites and diseases.

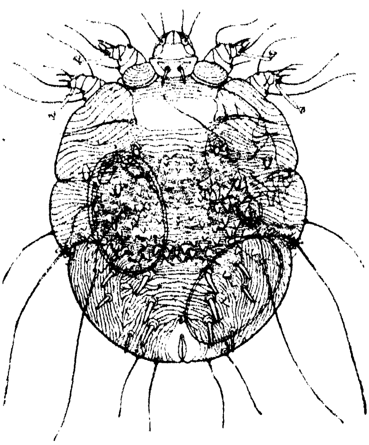
Life History.—Eggs deposited by the females are glued to the bristles of the pig and hatch in from 12 to 20 days, usually in about 14 days. The young louse is very similar in appearance to the adult, differing mainly in size. After hatching, the young lice commence feeding immediately, and after 10 to 12 days become mature. Lice may live as long as 35 days and during her lifetime the female lays about 90 eggs.

Mange Mites.

Two species of mange mites infest the pig; one species causes sarcoptic mange; the other demodectic mange.

Sarcoptic Mange (*Sarcoptes scabiei suis*). (Plate 18.)

Sarcoptic mange or common mange is caused by the mite *Sarcoptes scabiei suis*. This mite is very small, at most only one-fiftieth of an inch long, and whitish in colour. The body is rounded with four pairs of short, thick legs, and provided with a number of short, backwardly projecting spines on its upper surface. The parasites live in minute tunnels under the skin in which the female lays her eggs. These eggs hatch in 3 to 10 days, and after another 10 or 12 days the young mite becomes sexually mature.



[*After Hirst.*

Plate 18.

SARCOPTIC MANGE MITE.
(104 x natural size.)

Symptoms of Sarcoptic Mange.—The burrowing of the mites through the skin causes it to become inflamed and swollen. At first, these inflamed areas are very minute, but in time become very conspicuous and, as the mites increase, the lesions gradually coalesce. The irritation causes the animal to rub itself against any convenient object, the areas become raw and bleeding and large scabs are formed. The movements of the pig cause a continual breaking of the scabs, and blood and serum ooze out from the cracks. The bristles on the affected area fall out and eventually none, or only a few, remain. Later the skin becomes hard, thickened, and thrown into folds. In severe cases, the animals affected become weak and emaciated and, unless treated, may die.

In the early stages of the disease the lesions occur usually on the head, around the eyes, ears, and nose, and from here the disease spreads along the neck and shoulders until the entire body may be affected.

Demodectic Mange (*Demodex phylloides*). (Plate 19.)

This type of mange is caused by a very minute worm-like mite, *Demodex phylloides*. It is less common than sarcoptic mange. The mites of demodectic mange are microscopic in size, measuring only one-hundredth of an inch. They spend their entire life in the hair follicles and sweat glands and, when in numbers, cause well-marked lesions. These lesions may appear first on the snout or around the eyelids, and from there spread slowly over the throat, breast, abdomen, and other parts of the body where the skin is soft and thin. The affected skin becomes reddish and scurfy, with numerous small hard nodules. These nodules eventually break and discharge a creamy pus, and many of them may run together to form suppurating cavities.

Diagnosis of Parasitic Mange.

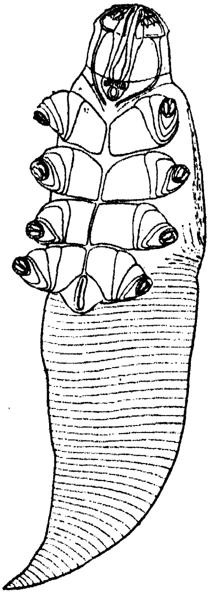
The pig may be subject to many kinds of skin diseases. When sarcoptic or demodectic mange is suspected samples of scrapings from the affected skin should be submitted for examination. The scrapings, to include the mites, should be taken from the more recent lesions, and should be made deep enough to cause bleeding. They are then placed in a tightly-corked tube or bottle and forwarded for examination.

Control of Lice and Mange.

Crude oil or fuel oil will be found satisfactory for the control of lice and mange. The oil may be applied by hand, and in view of its adhesive and spreading qualities only comparatively small quantities are required. In the case of lice, a second application is desirable after 15 days. For severe cases of sarcoptic mange frequent dressings are necessary; but tests have shown that a complete cure may be expected if careful and persistent treatment is given. Before being treated with the oil, the affected animal should be scrubbed thoroughly with warm soapy water.

No specific cure is known for demodectic mange, but frequent applications of crude oil check the disease. Animals not responding to treatment should be killed. Animals oiled with crude oil should be kept in the shade as much as possible until the oil has dried, as contact with the sun is likely to cause blistering, especially in the white breeds.

Hog oilers, medicated wallows and dips are sometimes recommended as a means of applying the oil to control lice and mange. Hog oilers consist of posts wrapped round with oiled ropes or sacking and placed at some convenient spot, the idea being that the pigs will rub themselves against the post so that a small quantity of oil is deposited on or near the area of skin being rubbed. These devices tend to lessen the spread of lice and mange, but are not to be depended upon to effect eradication or prevent the losses caused by heavy infestations.



[*After Hirst.*

Plate 19

DEMODECTIC MANGE MITE.

(328 x natural size.)

By taking advantage of the pig's natural tendency to wallow in water, especially during warm weather, the use of crude oil on the surface of the water has been found satisfactory for the control of external parasites. The wallows are constructed of concrete, and the water, with its film of oil, is just deep enough to permit the nostrils being kept above the surface of the liquid. For pigs of 40 to 80 lb. weight the depth should not exceed three inches, six inches being the maximum for the largest pigs. If the depth is too great the animal will be afraid to lie down. The wallow is roofed over to prevent the water becoming too hot. It should not be kept oiled continuously, but for short periods every ten days, until the desired results are obtained.

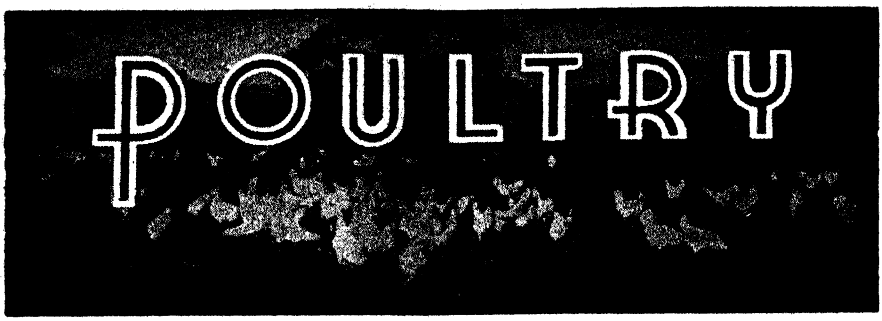
Dipping is one of the most effective treatments for lice and mange. For this purpose a concrete bath 40 to 48 inches deep with a total length of at least 7 yards, constructed on the same general principles as a cattle dip, is used. The dip is filled with water, on which crude oil is poured to a depth of four to five inches. Spraying haphazardly with oil cannot be expected to be very efficient.

Attention should also be paid to sanitation. As lice will not live for more than three days off the pig, it is not considered that sties which have housed infested pigs would, as a rule, be a source of danger under sanitary conditions. It is always safer, however, to clean and disinfect the sties before clean pigs are placed in them.

Mange is highly contagious, and pigs showing symptoms should be isolated immediately. Visible lesions of sarcoptic mange may develop in 14 to 15 days; so animals in contact with affected pigs should be isolated for 2-3 weeks. All litter and manure should be cleaned up and burnt and the sties given a thorough disinfection. It should be remembered that sarcoptic mange is transferable to man; so it is advisable, after handling affected pigs, to bathe and have a complete change of clothing.

Plate 20.

A CORNER OF A PIG'S "PARADISE," NEAR KINGAROY.



Transport of Poultry to Market.

P. RUMBALL, Officer in Charge, Poultry Branch.

THE conditions under which poultry are transported to market leaves room for improvement, both from the humane and the commercial point of view. From the humane point of view, crates used should be high enough to allow the birds sufficient head room, and have sufficient floor space for the number and variety to be consigned. The crates also should be well ventilated and have receptacles for water or food attached to the corner posts.

Crates for fowls and ducks should be at least 18 inches high; for turkeys and geese 30 inches high; this permits the birds to stand erect in their respective crates without injury. The area of the floor space in a crate depends on the class of birds, and the number crated at the one time. It is not desirable to have too large a crate. Crates 4 feet long by 2 feet 6 inches wide with a partition in the middle are sufficiently large for general purposes; the partition is to prevent the birds crowding to one end. Smaller crates are easier to handle.

To save freight, crates should be made of light timber, but should be well braced in order to make them sufficiently rigid so that other crates may be stacked upon them.

Most birds marketed today are sold by weight. Shrinkage or loss of weight naturally occurs when a bird is taken from its usual comfortable surroundings and regular feeding. Good crating may assist in reducing this loss of weight, and the greater the care and attention to the feeding of the bird in transit the higher will probably be the return.

According to some authorities, in preference to supplying birds in transit with water, they should be given a required quantity of grain which has been well soaked. This may be the best means of supplying both feed and drink during the journey, as hard grain scattered on the floor of the crate soon becomes soiled and distasteful to the bird, and water placed in containers may be spilt, merely wetting the floor of the crate. The quantity of grain supplied depends obviously on the length of the journey. On delivery at the slaughtering premises, crop and intestines should be empty. Only sufficient feed should be provided for the journey so that the birds shall arrive at the place of slaughter in this condition.

Recently, tests have been conducted to ascertain the shrinkage which occurs during rail journeys of varying distances, and of birds crated and held on a farm for given periods. Results of these tests are set out in the following table:—

REPORT OF TESTS TO DETERMINE THE LOSS OF WEIGHT OF POULTRY IN TRANSIT BY RAIL

Distance Travelled.	Crate Mark.	Net Weight of Fowls at Sending Station.	Net Weight of Fowls at Brisbane.	Number of Fowls in Crates.
		Lb.	Lb.	
21 Miles ..	Y	147	135	23
	13	81	75	19
	12	84	80	15
	18	70	67	16
	3 14 X Z	316	296	59
	..	698	653	132
106 Miles ..	A	90	87	16
47 Miles ..	B	48	45	10
	C	52	50	10
	D	49	47	10
	E	49	48	10
	F	51	49	10
	G	53	51	10
	H	52	50	10
	..	354	340	70

LOSS OF WEIGHT OF POULTRY CRATED AND HELD ON FARM.

Period of Crating.	Crate Mark.	Net Weight on Crating.	Net Weight End of Crating Period.	Number of Fowls in Crate.
		Lb. oz.	Lb. oz.	
12 hours ..	A	26 8½	25 6	4
12 hours ..	B	28 5	27 6	4
18 hours ..	C	26 8½	24 13	4

Excreta recovered crate A after 12 hours averaged 2 oz. per bird.
Excreta recovered crate B after 12 hours averaged 2 oz. per bird.
Excreta recovered crate C after 18 hours averaged 2.5 oz. per bird.

Note.—In the recovery of the excreta the more liquid type had spread over the iron catchment surface and was not recovered. No allowance was possible for evaporation from the more solid excreta.

TABLE SHOWING LENGTH OF JOURNEY, AVERAGE LOSS OF WEIGHT PER BIRD, AND THE PERCENTAGE LOSS OF WEIGHT PER BIRD.

Distance Travelled.	Average Loss per Bird.	Percentage Loss per Bird.
Miles.	Ounces.	Per cent.
221	5·99	7·0
106	3·0	3·3
47	3·2	3·95
*Held on farm 12 hours..	4·19	3·84
*Held on farm 18 hours..	6·87	6·47

* These birds were crated at 6 p.m. and had fed.

It will be noticed that birds held on the farm for eighteen hours lost 6·47 per cent., whilst those on a train journey of 221 miles which occupied 21 hours lost 7·0 per cent. It is reasonable to expect that the percentage loss in the weight of light breeds (being smaller birds), would be greater than was the case with these tests, in which most of the birds were of heavy breeds.

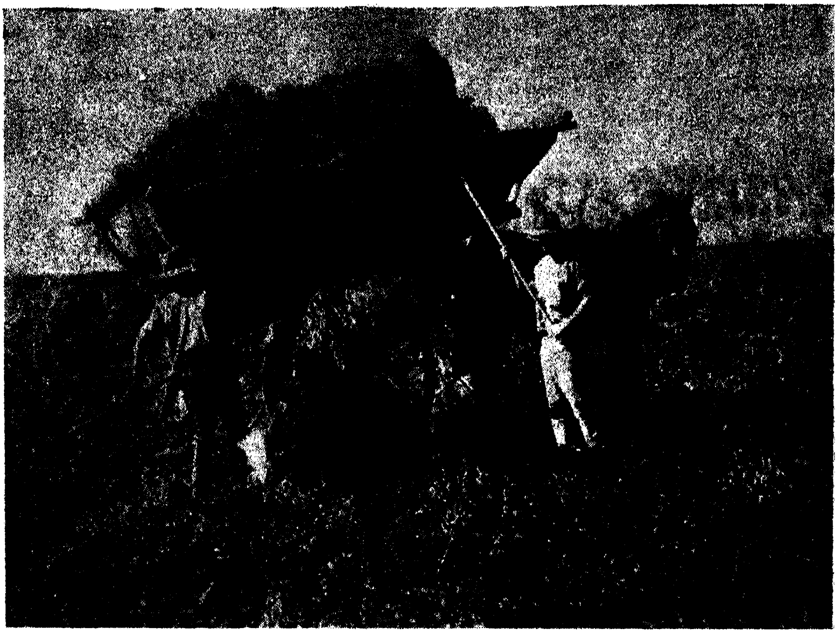


Plate 21.
LOADING PEANUTS FOR THE THRASHER ON A KINGAROY FARM.

Plate 22.
A COTTON-BREEDING PLOT NEAR KINGAROY.

GENERAL NOTES

Staff Changes and Appointments.

Mr. J. C. J. Maunder, B.V.Sc., Divisional Veterinary Officer, Department of Agriculture and Stock, Brisbane, has been appointed temporarily to act as Chief Inspector of Stock.

Mr. A. F. S. Ohman, M.V.Sc., Divisional Veterinary Officer, who has been serving with the A.M.F. and has returned to duty, will be attached to Brisbane.

Mr. R. D. Chester, B.V.Sc., Government Veterinary Officer, has been transferred from Rockhampton to Brisbane.

Mr. E. Widdup, Cotton Grader, has been appointed Adviser in Agriculture, and will be transferred from Gayndah to Rockhampton.

Mr. A. F. Moodie, Dairy Officer, who has been serving with the R.A.A.F., will be attached to Rockhampton.

Greetings Received.

Seasonal Greetings have been received from—

The Chairman and Members of the Soldiers' Homes Committee (''Kingshome''); the Hon. T. L. Williams, M.L.A.; the Hon. T. A. Foley, M.L.A.; the Fathers, Brothers and Students of St. Vincent's Mission Seminary, Marburg; Mr. W. C. Haigh, Ipswich; the Officers and Members of the Ipswich Workshops Educational Association; the Army Education Service; the Council of Agriculture; the Commissioner of Main Roads and Staff; the Butter Board; the Cheese Board; the Brisbane Milk Board; the Acting Under Secretary and Officers of the Department of Labour and Employment; the Under Secretary for Agriculture and Staff of the Western Australia Department of Agriculture; ''Queensland Country Life''; A.C.F. and Shirleys Fertilizers, Limited; E. G. Eager and Son Pty. Ltd.; Dunlop Rubber Australia Limited; Thermax Electric Water Heaters Pty.; Queensland Pastoral Supplies, Ltd.; Graham Book Company; Gestetner Pty., Ltd.; Australian Potato Commitee; Goodyear Tyre and Rubber Co. (Australia), Limited; Committee of Direction of Fruit Marketing; International Harvester Company of Australia, Limited.

All greetings are cordially reciprocated.

Carcasses Control by Northern Pig Board.

Notice has been given of the intention of the Governor in Council to make an Order in Council under *The Primary Producers' Organisation and Marketing Acts* to extend the provisions of such Acts to the carcasses of pigs grown in the area of the Northern Pig Board and to place such carcasses under the control of the Board. A petition for a poll on the question of whether or not such Order in Council shall be made may be lodged with the Department of Agriculture and Stock on or before 7th January, 1946, and must be signed by at least 50 persons who are keepers of pigs within the Northern Pig Board's area, and who delivered at least ten pigs to the Board in the six months ended 30th June, 1945.

Pasteurization Plant at Rockhampton.

An Order in Council has been issued under *The Milk Supply Act of* 1938, authorizing the Port Curtis Co-operative Dairy Association Ltd. of Gladstone, to establish and carry on a pasteurization plant at Rockhampton and to supply pasteurized milk and cream within the area of the City of Rockhampton.

Following on the recent ballot of dairymen which, by a 90 per cent. majority agreed to the setting-up of a compulsory organisation for the dairying industry under section 30 of *The Primary Producers' Organisation and Marketing Acts,* 1926 to 1941, an Order in Council has been issued making the necessary modifications and additions to section 30 of the abovenamed Acts, authorising the establishment of a statutory organisation, which will now be proceeded with by the Department of Agriculture conducting elections of district councils within the nine prescribed districts.

Rural Topics

Science Sees the Farmer Through.

The steady decrease in farm population is something to think about. Many farmers are actually ceasing to farm, and are moving to swell the ranks of the city workers and eaters. This movement from the land was especially noticeable while the war was on, and, of course, there were many obvious reasons for it—higher wages in munition industries, for instance. Yet, it would seem that as Australia is planning for many more mouths to feed, the farm population should also increase, instead of going into reverse. Something must be out of joint or alignment. Still there is another side to the question. Ideas about farming are changing with the extension of agricultural science and the use of agricultural machinery. A new-type farmer is evolving and this new-type farmer is the joker in the pack, and in the logic. This new sort of farmer has learnt how to increase his crops and dairy output without increasing the number of hands to do the work. He knows how—which is to say, he is scientific.

The work of the new-type farmer has been gradually revolutionising the farm, and even re-modelling the man behind the plough and the herd. The new-type farmer has struck up a very friendly acquaintance with the soils of his farm; he has dosed the sour sods with lime, jacked up others with salts, fed them with cowpeas and other green manuring material so as to give his roots and grains and grass a better go. He has developed a better kernel in the cob and a better ear on the stalk and has standardized his spuds in convenient kitchen size and higher quality. He goes after bugs, beetles, and borers with poison dusts and sprays. He feeds his stock with the right stuff for selling weights. He has turned his eyes and testing tubes on to his dairy herd, and sacked the star boarders. He pets the bucket fillers, feeds them according to formula and watches the figures expand on his monthly cream cheque.

In short, whatever the crop, whatever the animal, this new type of farmer knows how to breed it, feed it, and sell it. His theory is that neither luck nor tall tales can take the place of knowing how to farm. He has scrapped the old hand tools and put in machinery—the tractor, the combine, the milking plant, and so on. Moreover, the more he knows his job, the better he likes it. Getting close to his problem stirs his brain power into action and his job of farming takes on all the aspects of a challenging competition—the man against the elements, the farmer against the market manipulators.

It is nothing new of course that science is going into farming, that science and practice are working in double harness. But we have not all realized yet the meaning of this movement—that the old farming with ordinary skill will soon have passed into history as a tale that is told. This is, naturally, no discredit to the old-type farmer who in his day did a great job; he was a very fine man who very often started behind scratch on a scrub selection with a brush hook, a ''Black Kelly'' axe, a file, and a grindstone his only tools; a bag of flour, a sugar bag of sundries, and what he could get with a gun his only tucker; and a hand planter and an ''Invincible'' corn sheller his only machinery. It was his kind, the men and women who were game to pioneer in the rough and tough places and build happy homes in the wilderness, who made the nation. But one of these new farmers knows how to produce twice as much as he did.

Will our farm population, then, continue to decline? Well, it may continue to decline to a point where effective scientific farming may produce all that is needed. However, that is not the end of the story.

The changes occurring in farming practice are largely in relation to crops, but the progressive farmer is convinced that the same scientific principles and improved technical methods he has learnt to apply in running his farm can be used in getting over his other difficulties. The farmer's living conditions, for instance—community institutions, social status, opportunity for enjoying life in equal measure with those in other occupations, whether skilled crafts or professions—have not always been commensurate with the importance of his calling.

Science is penetrating through every phase of farm life. The new-type farmer knows that men make their own living conditions, and that human elements can be combined in the establishment of needed institutions. He will not listen to people who tell him of the difficulties in the way of his getting whatever the average city man has in the form of services and amenities—refrigeration, electric light and power, for example. If anyone thinks that the new sort of farmer will confine his acceptance of science to crop production he should think again, for the farmer will insist on a full share of the social amenities in a well-organised national life. And among other things, he will insist on full educational opportunities for his children. The farmer of to-day knows how the country is governed, how public business is managed, how sound economic institutions are built, how living standards can be improved, how far the co-operative idea can be extended and its principles applied. He is a believer in the gospel of good farming, and of good living, and of good family life, and he is looking to science to see him through.

Farming in America—Some Highlights and Sidelights.

Here are a few general impressions of farming in the United States gathered, with a lot of other interesting information, from a farmer who was over there recently on an official visit:

Family farming, which is more frequently the practice in the Eastern States and the Middle West, is considered to be the backbone of American agriculture. With modern machinery and well-planned farm buildings, the family farm in area ranges from 160 to 320 acres. Erosion, the result of years of over-cropping and periodical droughts, has caused many difficulties in some districts. Much has been done, however, in recent years to counteract erosion by contour ploughing, strip cropping and proper rotations. In the North, in parts of Wisconsin particularly, loss of topsoil resulting from periods of very heavy rainfall, causes many problems. There, again, strip farming is practised to prevent the surface soil from being washed away and uncovering sandy subsoil.

American farmers, like ourselves, depend to a great extent on seasonal labour.

Farmers' co-operative societies have a big say in the marketing of the United States farmers' products and supplying their crop and harvesting requirements, especially in regard to fruit, dairy and poultry production. Many of these co-operative societies own and operate refrigerating plants with canning and packing departments, and they are great believers in an attractive get-up of farm products as a principle of profitable marketing. The co-operative societies and other farmers' organisations over there work in well together; if a farmer trades through a co-operative society, he automatically becomes a member of the National Farmers' Union.

In the United States, there are three main farmers' organisations—the National Farmers' Union, the Grange and the Farm Bureau. There are approximately 30 millions of people (roughly a quarter of the whole population of the States) engaged in food production.

A thing which impresses a visitor is the American farmers' keen interest in and care of his livestock. We saw a lot of evidence of this at the cattle show in Brisbane last August, at which the attendance was made up so largely of farmers among the United States Forces then billeted around Brisbane. The American farmer has developed excellent types of beef and dairy cattle, and his care and good management is shown in his selection and breeding of livestock generally. In his herd, there is generally a low incidence of disease, showing his initiative and thirst for knowledge of the latest and best methods of management.

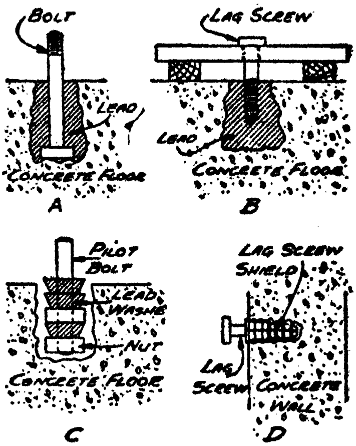
In regard to Government measures to assist farmers, it seems that the New Deal we heard so much about had a somewhat mixed reception. The "parity" payments it provided for in return for restricted output in years of surplus production were all right for the small farmer, but not for the larger farmer who had no desire to be dependent on subsidies.

The United States Soil Conservation Service organizes farmers in soil conservation areas, carries out research in erosion control and arranges field demonstrations on what to do about it—methods, devices and so forth.

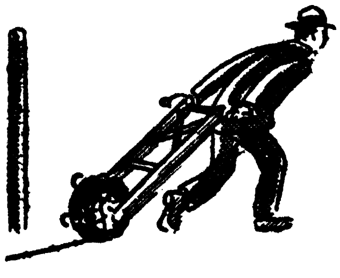
GADGETS AND WRINKLES

ANCHOR BOLTS IN CONCRETE.

Here are four handy methods of anchoring machines or timbers to concrete floors or walls. The first method (A) shows the usual method of fastening sills to concrete floors with ordinary machine bolts with the heads embedded either in the fresh concrete or in holes filled with lead. There should be no water or oil in the holes to make the hot material spatter. Machines are often fastened to concrete floors by drilling an irregular hole. (B) Setting in a lag screw, and then pouring lead in around it. The lag screw can then be unscrewed and tightened as desired. Timbers and machines may also be fastened to concrete walls and floors. (C) By using lag screw expansion anchors put into a hole in the concrete and expanded as the lag screws are turned into them; or (D) by putting an ordinary nut on the end of a pilot bolt, slipping lead washers over the bolt and spreading them with a loose nut and a short piece of pipe until firmly wedged. Then the pilot bolt is turned out and a machine bolt of the desired length screwed in.



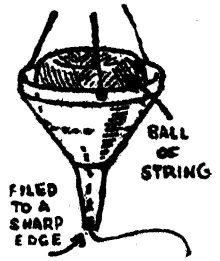
BARBED WIRE ROLLER.

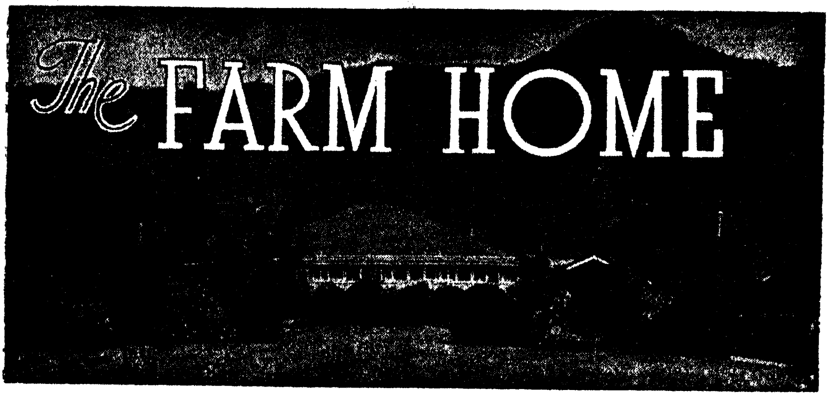


For easy handling of barbed wire, take two pieces of 2 x 4, about 4 feet long, space them 12 inches apart, bore a ½-inch hole in the bottom, and insert a rod to hold the wire spool in place so that the wire will unroll from the bottom. Start pulling as shown in drawing and you will lay your wire out without anyone getting scratched or hurt. It is much better than two men unrolling the spool on a pole.

OLD FUNNEL FOR TWINE.

One of the most convenient places to store a ball of cord is an old funnel suspended from a suitable hanger. File the end of the funnel spout to a sharp edge, letting the free end from the inside of the ball extend through the spout.


BALL OF STRING
FILED TO A SHARP EDGE



Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

FATHERCRAFT.

MANY fathers are now, or soon will be experiencing the joys as well as the problems of their relationship for the first time. Not because a new baby has just arrived into the family circle, but because of the breaking up of home life inseparable from war time conditions, their small children have spent several years solely in the care of their mothers.

Now is the time for the father to realize how much care and tact are needed to adjust little sons and daughters to the change of having two parents, instead of only one.

Delighted though the children may be to have father home—a real person instead of just a picture—they may in some cases find it rather hard to have that same father taking so much of their mother's time and attention, which has so far been given solely to them and their special demands.

Where an only child is involved, the ''hurt'' may be greater, and if behaviour problems and inhibitions are not to result, both parents should try to understand the child's point of view, and endeavour to tide over this difficult period with loving tact.

Most people are familiar with the word ''mothercraft'' and understand in a general way what it means. With the word ''fathercraft'' they are not so familiar, but in England and other countries the fathercraft movement, as it is called, has been in existence for some years. It is realised by welfare workers that although much of the actual care and handling of the young child is the province of the mother, the training of the child's mind should be shared by both parents, even from the earliest days.

For this reason, in England and America, fathers' groups have been formed in connection with child welfare centres in order to interest and educate fathers in maternal and child welfare, and teach them to take their rightful place in the parent-child relationship. Fathers belonging to these groups meet and discuss problems associated with their children's upbringing, and lectures are given by specialists on the various aspects of child care and development.

Opportunities are provided for personal interviews in regard to children whose nutrition or management had proved difficult, and experience has shown that these interviews are of the greatest value to young fathers.

It is essential that the father should understand the responsibilities of motherhood and should appreciate the mother's outlook in order that he may give her the support which is necessary for the harmonious working of the household.

In regard to the children's behaviour, much will depend on the extent to which companionship and goodwill exist in the home and even though a father may need time and patience in readjusting himself to civilian life, he must not be unmindful of his responsibility to the children at the same time.

Although fathers' clubs have not been formed in Queensland yet, the Maternal and Child Welfare Service which has been helping the mothers bear their burdens during the war years is now just as ready to help returned fathers to deal with their new relationships. Telephone or write to the *Medical Director, Maternal and Child Welfare, 184 St. Paul's Terrace, Brisbane.*

* * *

IN THE FARM KITCHEN.

Salads.

Cauliflower Salad.

One large, firm cauliflower, 2 lettuces, 1 tablespoon chopped parsley, 2 hard-boiled eggs, 6 small tomatoes, salad dressing. Boil cauliflower head in salted water about 20 minutes, till tender but not broken. Drain and place when cold upright in a salad bowl. Round it arrange lettuce leaves (uncut and standing upright) and saturate with dressing. Sieve egg yolks and chop parsley. Cut a cross on top of cauliflower to form four divisions; in two sprinkle chopped parsley and in the other two the egg yolks. Arrange tomatoes among the lettuce leaves; the egg whites are not required.

Cabbage Salad.

Salad made from an old cabbage is delicious if treated in this way: Shred finely the heart and place in a deep bowl. Pour over sufficient boiling water to cover completely. Stand for an hour and then drain, squeezing out all surplus water. This does away with the excessively ''raw'' flavour. The cabbage may then be dressed and garnished to taste.

Boiled Salad Dressing.

Take 2 eggs, 1 cup sugar, 1 teaspoon mustard, ½ teaspoon salt, 1 tablespoon butter, almost 1 cup milk, 1 small cup vinegar. Beat eggs, mustard, salt, and sugar together, then add vinegar and lastly milk. Melt butter separately, add to other ingredients. Simmer until thick, stir well, but do not boil. Keeps well.

Egg and Green Pea Salad.

Poach eggs hard (one per person) and leave till cold. To every 4 eggs allow 1 cup cooked green peas, with enough mayonnaise to bind. Season with pepper, salt, and a pinch of sugar. Place a crisp lettuce leaf for each egg on a salad dish, put an egg in the centre of each leaf, heap a few green peas on top of the eggs and spread a little more mayonnaise over all. Garnish with cress or tiny bits of radishes and serve as cold as possible.

Salad Dressing Without Eggs.

Quarter pint milk, ½ teaspoon mustard, ½ teaspoon sugar, 2 teaspoons vinegar, 1½ teaspoons cornflour, ¼ teaspoon salt, pepper to taste. Mix the cornflour to a smooth paste with a little water. Bring milk to the boil. Stir in the creamed cornflour, and cook for three minutes, stirring constantly. Remove from the stove. Cool slightly. Mix the mustard, salt, sugar, and pepper to taste with the vinegar and stir into the sauce. Use for dressing any cooked vegetable salad or for tongue, corned beef, or ham and potato salad.

Mixed Vegetable Salad.

Swede turnip (raw, grated), piled in centre of plate. Slice ripe tomatoes in halves and pile with grated white turnip. Place in lettuce leaves and arrange round swede. Garnish with cress.

Potato Salad.

Take several potatoes, parsley, onion, and mayonnaise. Cook the potatoes and then slice them in neat pieces. Mix chopped parsley and onion together with the mayonnaise. Toss the potatoes into the mixture and pile it into dishes.

Apple and Celery Salad.

Core and peel apples and cut in strips the size of matches. Have equal quantity of celery cut same size, sprinkle with salt and mix lightly together. Cover with mayonnaise dressing and serve in individual quantities on lettuce leaves or alone.

ASTRONOMICAL DATA FOR QUEENSLAND.

FEBRUARY.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	5.21	6.42	Cairns	41	16	Longreach	40	30
6	5.24	6.40	Charleville	29	25	Quilpie	34	36
11	5.28	6.36	Cloncurry	57	42	Rockhampton ..	15	5
16	5·32	6.32	Cunnamulla ..	28	30	Roma	18	16
21	5.35	6.28	Dirranbandi ..	18	20	Townsville	34	16
26	5.38	6.23	Emerald	24	14	Winton	46	34
28	5.39	6.21	Hughenden ..	42	27	Warwick	4	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.

Date.	Rise.	Set.
	a.m.	p.m.
1	3.59	6.11
2	4.58	6.58
3	5.59	7.40
4	7.01	8.20
5	8.03	8.58
6	9.05	9.34
7	10.06	10.11
8	11.09	10.49
9	p.m. 12.13	11.30
10	1.18	..
11	2.23	a.m. 12.16
12	3.26	1.07
13	4.26	2.04
14	5.21	3.04
15	6.09	4.06
16	6.52	5.08
17	7.29	6.09
18	8.04	7.07
19	8.36	8.03
20	9.07	8.57
21	9.38	9.50
22	10.11	10.42
23	10.46	11.35
24	11.24	p.m. 12.29
25	..	1.23
26	a.m. 12.06	2.17
27	12.54	3.10
28	1.46	4.01

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17 Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	28	11	44	26	19	1	52	29
6	20	19	36	35	11	10	42	41
11	12	27	27	42	1	18	29	50
16	13	26	29	42	3	17	32	49
21	23	16	39	32	14	8	44	36
26	27	11	43	25	18	0	51	28
28	29	11	44	25	19	0	52	28

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	51	6	65	35	49	21	42	8
3	46	13	61	40	46	25	37	14
5	37	23	55	46	40	31	31	21
7	26	34	48	54	33	38	22	29
9	15	43	41	59	26	45	15	36
11	8	47	37	62	21	47	8	39
13	6	51	36	64	20	50	7	43
15	10	48	38	62	23	48	10	40
17	18	42	43	58	28	44	17	35
19	28	33	50	53	34	38	24	28
21	37	22	55	45	40	30	31	20
23	45	13	61	40	45	25	37	14
25	49	7	63	36	48	21	40	8
28	52	5	66	34	50	20	43	7

PHASES OF THE MOON.

New Moon, February 2nd, 2.43 p.m.; First Quarter, February 9th, 2.28 p.m.; Full Moon, February 16th, 2.28 p.m.; Last Quarter, February 24th, 12.36 p.m.

On February 26th the Sun rises and sets 10 degrees south of true east and true west, respectively, and on February 6th the Moon will set true west.

Venus.—At the beginning of the month, in the constellation of Capricornus, and at the end of the month, in the constellation of Aquarius, Venus will be too close in line with the Sun for observation. It will be at superior conjunction with the Sun on February 1st.

Mars.—This planet during this month, in the constellation of Gemini, will rise before sunset and will be a brilliant object in the eastern sky in the early evening. At the beginning of the month it will set between 3.15 a.m. and 4.15 a.m., about 28 degrees north of true west. At the end of the month it will set between 1.15 a.m. and 2.15 a.m.

Jupiter.—At the beginning of February, Jupiter, near Spica in the constellation of Virgo will rise between 10.15 p.m. and 11.30 p.m., about 10 degrees south of true east. At the end of the month it will rise between 8.30 p.m. and 9.30 p.m.

Saturn.—Saturn will still be close to Mars, rising before sunset, and setting in the early part of the month between 3.30 a.m. and 4.45 a.m., about 25 degrees north of true west. At the end of the month it will set between 1.45 a.m. and 3.00 a.m. At 7 p.m. on the 13th this planet will be 2 degrees south of the moon with Mars about 4 degrees to the northward.

OUR CALENDAR.

In the October issue it was mentioned that in the tropical year of 365.24219 days, on which our calendar is based, the seasons alway occupy the same place with respect to its commencement. In the earliest calendars attempts were made to fit the lunar month into this year, but as the number of days in a lunation (29.5306) does not divide evenly into the number of days in the year, frequent corrections to the calendar were required to keep it in step with the seasons. Either through neglect or ignorance on the part of those whose duty it was to attend to such matters, the adjustments were most irregular until in 46 B.C. Julius Caesar, with the help of Sosigenes of Alexandria, put an end to such disorder. He abolished the use of the Lunar year and regulated the civil year entirely by the Sun. In the calendar which he introduced, and known as the Julian calendar, 3 successive years were made to consist of 365 days each and the 4th of 366 days, making the mean length of the year 365¼ days. However, the error from adopting 365¼ days as the length of the year, in 400 years amounts to 3 days too much, and in 1582 Pope Gregory XIII. besides adjusting the error that had arisen through the use of the Julian calendar, introduced the calendar which we use to-day—the Gregorian calendar. Whereas in the Julian calendar every 4th year is a leap year, Gregory added the restriction that only those century years which can be divided evenly by 400 were to be leap years, thus the years 1700, 1800, and 1900 were years of only 365 days, but the year 2000 will be a leap year of 366 days. By this arrangement the mean length of the calendar year is 365.2435 days and in 3,000 years the calendar will be only 1 day out of step.

◆

QUEENSLAND WEATHER IN DECEMBER.

A series of useful rains in the North-west resulted in an aggregate over average 3 to 6 inch-distribution south from Burketown and Normanton to Urandangie and Cloncurry, with some lighter amounts south-east to Winton. Moderately heavy daily seasonal falls also were registered in restricted Cairns, Tully coastal areas. Apart from the Upper-west however all inland pastoral districts showed discrepancies. Rainfall was of the variable thunderstorm type, with temporarily useful amounts confined mainly to eastern sections of the Central Highlands and parts of the Warrego and Maranoa. Although there were one or two storms in the South-West and along the Southern Border, most of the east Carpentaria, Central, and Southern Interior districts urgently required a good soaking monsoonal rain to offset the previous four-month dry period. The South-east districts fared better in the thunderstorm conditions, with best normal results of 2 to 4 inches in the Eastern Downs. In the South Coast sections average seasonal conditions should be maintained, except in some of the drier areas. There were also only very light amounts registered over the southern half of the Central Coast Division.

Temperatures.—Maximum and minimum temperatures at Longreach and Thargomindah were above average, 2.4 degrees and 1.0 degrees the former and 3.6 degrees and 3.0 degrees the latter. Other districts were about average, but during the first half of the month high temperatures were general inland. During the last two weeks cooler conditions prevailed, especially in coastal sections where temperatures were below normal for several days. Highest maximum—112 degrees at Thargomindah, 14th and 15th, and Windorah 15th. Consecutive days over 100 degrees—Boulia 15, Cloncurry 10. Number of days over 100 degrees—Cloncurry and Longreach 20, Boulia 19.

Brisbane.—Mean Pressure $\frac{9 + 3}{2}$ 29.973 (normal 29.887). Temperatures—mean maximum 81.8 degrees (normal 84.7 degrees), mean minimum 64.4 degrees (normal 67.4 degrees), mean temperature 74.1 degrees (normal 76.1 degrees). Temperatures under normal from 18th to 31st except 28th. Rainfall—532 points on 14 days (normal 505 on 12 days). Sunshine—266.9 hours (normal 252.6 hours). Wind gust—46 miles per hour (south) at 2110 hours 4th.

The rainfall position is summarised below—

District.	Normal Mean.	Mean Dec., 1945.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	702	484	31 below
Peninsula South	605	379	37 ,,
Lower Carpentaria	392	344	12 ,,
Upper Carpentaria	377	126	66 ,,
North Coast, Barron	690	747	8 above
North Coast, Herbert	690	376	46 below
Central Coast, East	454	138	69 ,,
Central Coast, West	333	191	43 ,,
Central Highlands	316	162	49 ,,
Central Lowlands	221	57	74 ,,
Upper Western	184	315	71 above
Lower Western	137	54	61 below
South Coast, Port Curtis	455	210	54 ,,
South Coast, Moreton	509	394	23 ,,
Darling Downs East	351	353	1 above
Darling Downs West	277	173	37 below
Maranoa	258	214	17 ,,
Warrego	215	137	36 ,,
Far South-West	155	65	58 ,,

Commonwealth of Australia, Meteorological Bureau, Brisbane.

Brisbane, 4th January, 1946.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

NOVEMBER RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Nov.,	No. of years' reccrds.	Nov., 1944.	Nov., 1945.
North Coast.	In.		In.	In.
Atherton	2·60	42	0·60	1·74
Cairns	3·81	61	1·14	8·39
Cardwell	4·14	71	0·25	3·07
Cooktown	2·45	67	0·02	0·15
Herberton	2·68	57	0·48	2·02
Ingham	3·75	51	0·07	1·69
Innisfail	6·25	62	0·62	2·72
Mossman	5·75	19	0·80	2·09
Townsville	1·87	72	0·33	0·21
Central Coast.				
Ayr	1·67	56	Nil	0·32
Bowen	1·24	72	0·48	0·09
Charters Towers ..	1·43	61	Nil	1·54
Mackay	3·05	72	0·59	1·63
Proserpine	2·82	40	0·07	1·14
St. Lawrence ..	2·40	72	0·18	1·67
South Coast.				
Biggenden	2·90	44	1·33	1·86
Bundaberg	2·79	60	1·88	0·70
Brisbane Bureau ..	3·77	93	3·77	4·64
Caboolture	3·51	67	7·08	4·23
Childers	2·81	48	1·35	0·94
Crohamhurst.. ..	4·55	50	5·22	2·86
Esk	3·25	56	2·93	4·19
South Coast—cont'd.	In.		In.	In.
Gatton College ..	2·87	44	3·08	..
Gayndah	2·97	72	0·57	1·70
Gympie	3·33	73	2·81	1·17
Kilkivan	2·66	62	3·31	0·84
Maryborough ..	3·20	72	3·69	1·05
Nambour	4·21	47	3·33	4·16
Nanango	2·86	61	1·38	2·98
Rockhampton ..	2·48	72	0·86	2·28
Woodford	3·29	55	3·38	4·00
Darling Downs.				
Dalby..	2·80	73	3·08	3·93
Emu Vale	2·81	47	1·70	1·68
Jimbour	2·50	64	1·30	4·36
Miles	2·58	58	0·67	3·91
Stanthorpe	2·76	70	2·04	1·37
Toowoomba	3·33	71	2·49	4·11
Warwick	2·66	78	1·86	1·78
Maranoa.				
Roma	2·17	69	0·65	1·91
St. George	1·75	62	0·21	0·74
Central Highlands.				
Clermont	2·15	72	0·07	0·61
Springsure	2·39	74	2·40	2·09

CLIMATOLOGICAL TABLE FOR NOVEMBER.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure Mean at 9 a.m.	SHADE TEMPERATURE.		EXTREMES OF SHADE TEMPERATURE.				RAINFALL.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	86	71	89	5, 19, 20, 23, 25	68	4, 7, 27	339	9
Herberton	..	82	61	88	16	58	13	202	6
Townsville	..	86	73	92	21, 22	66	4	21	7
Rockhampton	29·98	88	65	97	30	53	6	228	7
Brisbane	30·02	81	65	90	30	60·5	1	464	15
Darling Downs.									
Dalby	..	87	59	95	6	52	1	393	6
Stanthorpe	..	79	53	86	6	42	12, 22	137	6
Toowoomba	..	79	56	89	6	46	15	217	7
Mid-Interior.									
Georgetown	29·89	99	71	102	18, 22	57	13	12	2
Longreach	29·95	96	68	107	16	58	1	16	2
Mitchell	29·96	89	61	98	17	46	1	159	7
Western.									
Burketown	..	94	72	102	23	62	14	154	3
Boulia	29·88	96	66	108	25	57	1, 12	9	1
Thargomindah	29·93	92	65	105	27	53	11	Nil	..

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

DECEMBER RAINFALL.

(Compiled from Telegraphic Reports).

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Dec.,	No. of years' records.	Dec., 1944.	Dec., 1945.		Dec.,	No. of years' records.	Dec., 1944.	Dec., 1945.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	7·02	42	11·25	5·98	Gatton College	3·89	44	4·04	Nil
Cairns	8·53	61	4·14	12·31	Gayndah	4·21	72	4·04	1·83
Cardwell	7·95	71	4·60	5·35	Gympie	5·40	73	5·67	2·91
Cooktown	6·53	67	8·90	6·88	Kilkivan	4·61	62	4·96	2·36
Herberton	5·64	57	7·67	3·21	Maryborough	5·05	72	5·69	3·12
Ingham	6·77	51	2·33	4·15	Nambour	6·65	47	4·96	8·04
Innisfail	11·16	62	8·86	5·90	Nanango	3·86	61	5·04	2·59
Mossman	8·00	19	10·14	10·09	Rockhampton	4·67	72	4·22	1·98
Townsville	5·33	72	2·91	1·01	Woodford	5·34	55	3·03	3·62
Central Coast.					*Darling Downs.*				
Ayr	4·20	56	5·50	2·33	Dalby	3·49	73	1·61	3·27
Bowen	4·49	72	3·47	1·42	Emu Vale	3·52	47	2·71	2·25
Charters Towers	3·26	61	8·26	2·35	Jimbour	3·44	64	2·62	2·23
Mackay	6·86	72	2·56	2·00	Miles	3·17	58	1·84	2·69
Proserpine	7·72	40	3·93	2·41	Stanthorpe	3·56	70	3·26	3·60
St. Lawrence	4·67	72	3·28	0·33	Toowoomba	4·53	71	2·40	4.43
					Warwick	3·50	78	2·74	2·86
South Coast.									
Biggenden	4·85	44	5·62	4·92	*Maranoa.*				
Bundaberg	5·10	60	3·84	1·12	Roma	2·59	69	1·26	2·35
Brisbane Bureau	5·05	93	3·47	5·32	St. George	2·09	62	0·30	1·36
Caboolture	5·48	67	4·02	2·91					
Childers	5·80	48	4·57	1·48	*Central Highlands.*				
Crohamhurst	7·19	50	2·66	5·14	Clermont	3·77	72	2·94	1·13
Esk	4·76	56	1·83	7·74	Springsure	3·28	74	5·96	1·53

CLIMATOLOGICAL TABLE FOR DECEMBER.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric Pressure Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	89	73	93	20	66	30	1231	11
Herberton	..	..	..	..	..	..	..	..	..
Townsville	.	87	75	89	1, 20, 24	69	21	101	8
Rockhampton	29·93	90	69	96	13	63	22	198	7
Brisbane	30·01	82	66	92·6	13	62	7	532	14
Darling Downs.									
Dalby	..	87	62	97	13	54	21, 26	327	7
Stanthorpe	..	80	56	92	13	48	1	360	6
Toowoomba	..	80	59	95	13	51	26	443	8
Mid-Interior.									
Georgetown	29 85	97	73	102	2, 3, 4, 5, 15	64	28	149	3
Longreach	29·89	101	72	110	14	63	1	50	2
Mitchell	29·93	92	67	104	13, 14	53	29	295	5
Western.									
Burketown	.	94	75	104	1	70	1	640	13
Boulia	29·79	101	74	109	15	66	3, 29	72	2
Thargomindah	29·84	99	74	112	14, 15	64	1, 8, 28	85	3

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

Volume 62 Part 2

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

FEBRUARY, 1946

Issued by Direction of
THE HONOURABLE T. L. WILLIAMS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

PAGE.

Event and Comment—
- The Case for Queensland Wheat .. 67
- Fodder Conservation 68

Field Crops—
- Soil Conservation and Erosion Prevention 69

Fruit Culture—
- The Use of Borax on Waltham Cross Grapes in the Stanthorpe District 74

Plant Protection—
- Lucerne Pests 79

Sheep and Wool—
- " Swelled Head " of Sheep 90

The Dairy Industry—
- Milk Supplies and Cheese Quality .. 92

The Pig Farm—
- Management of Pigs in Relation to Disease Prevention 98
- Ear Notching of Pigs 111

Registered Hatcheries 116

Queensland Show Dates 118

PAGE.

General Notes—
- Staff Changes and Appointments .. 119
- End of Poultry Mash and Crude Protein Rationing 119
- Expansion of the Wool Branch .. 120
- Extension of Veterinary Services .. 120
- Vegetable Group Committee 120
- Sugar Values 120

Rural Topics—
- Junior Farmers Come to Town .. 121
- The Bid for Better Butter 122
- Rules for Riding 122

The Farm Home—
- The Problem of the Only Child .. 124
- Useful Hints 125

Astronomical Data 126

Queensland Weather in January .. 127

Rainfall in the Agricultural Districts .. 128

Climatological Table for December .. 128

S. P. A.

(SAVE POUNDS ALWAYS)

IMPORTED SEED OATS

The heaviest, cleanest, and best oats only purchased for seed by us and then these are RECLEANED, REGRADED and CLIPPED.

NO WASTE—NO WEEDS

Algerians	Belars
Fulghums	Mulgas
Sunrise	Buddahs

BOOK NOW—prices are reasonable.

DELIVERY WHEN REQUIRED.

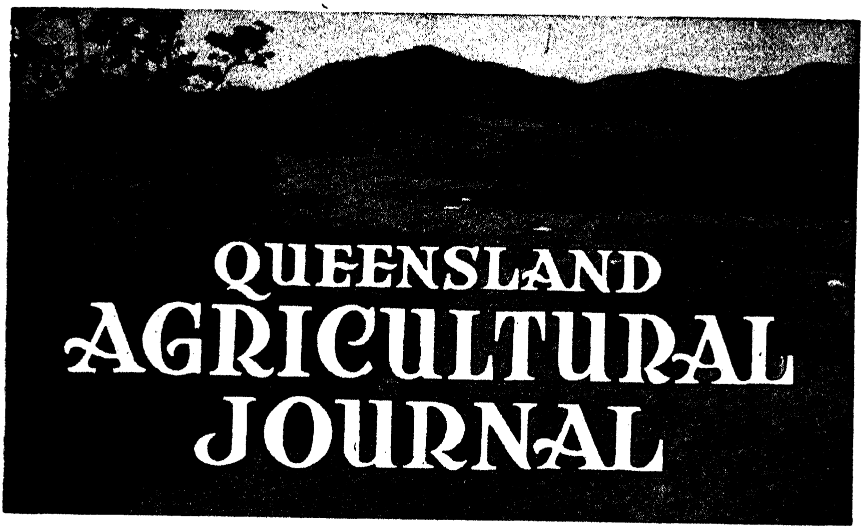
STATE PRODUCE AGENCY Pty. Ltd.

Agricultural Seedsmen, Farm Produce Agents,

266-274 ROMA STREET, BRISBANE.

[illegible]

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, including postage. General Public, **Ten Shillings**, including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Volume 62 1 FEBRUARY, 1946 Part 2

Event and Comment.

The Case for Queensland Wheat.

ON his return from the recent conference at Canberra, at which State Ministers for Agriculture and the Federal Minister for Commerce and Agriculture considered plans for the stabilization of the Australian wheat industry, the Queensland Minister (Hon. T. L. Williams) said that the case for the wheatgrowing interests in this State and the future of the industry here had been kept well to the forefront of discussion. He added that the scheme proposed would ultimately be based on the joint legislative powers of the Commonwealth and the States to take the place of the present wheat stabilization scheme when the operation of the *National Security Act* is discontinued, presumably in July next. The stabilization scheme agreed to in principle for submission subsequently to the Premiers' Conference provides mainly for a guaranteed minimum price for all wheat of 5s. 2d. a bushel for fair average quality grain or its equivalent f.o.b. at ports for a period of five years.

Continuing, Mr. Williams said that after considerable discussion, in which he strongly pressed the Queensland scheme for consideration in the direction of having this State's wheat pooling system, with its special wheat classification and hail insurance provisions, preserved and included within the wider scheme, the conference finally agreed to the proposal. An additional advantage which he hoped he had gained for Queensland followed his advocacy of this State's capacity to expand its wheat production by the planting of larger areas, with the result that an assurance was given without hesitation by the Federal Minister for Commerce and Agriculture that Queensland would be conceded a system of licensing which would eventually permit of a million acres of wheat being planted in this State.

Regulation of production as an integral part of the scheme and a natural corollary to the guaranteed price led also to considerable discussion. Such a scheme, it was pointed out, would be designed to take its place within a world-wide plan to be set up under an international wheat agreement. Consequently, said Mr. Williams, if the proposed stabilization scheme is approved in principle, the details will subsequently be worked out by Commonwealth and State officers, and legislation by the States will be necessary to provide for the regulation of production.

Fodder Conservation.

A SILO is a definite asset on any farm, and it is doubtful if the outlay involved could be expended on any other improvement with greater financial benefit. In Queensland, increased butter production alone from cows fed on silage during the dry winter and spring months of normal years would compensate for the cost involved. In addition, a well-filled silo is an effective and immediately payable drought insurance at a time when fodder necessary to keep cows in full profit is unprocurable from outside the farm fence.

Although conservation of fodder in the form of silage has been practised in Queensland for many years, the aggregate amount stored annually has been far below ordinary winter requirements, apart altogether from its value as a drought reserve which should, as a matter of common prudence, be stored in years of abundance. Soil and climatic conditions throughout the agricultural districts of the State are generally very favourable for the growing of many summer fodder crops, which provide a great bulk of material suitable for silage making.

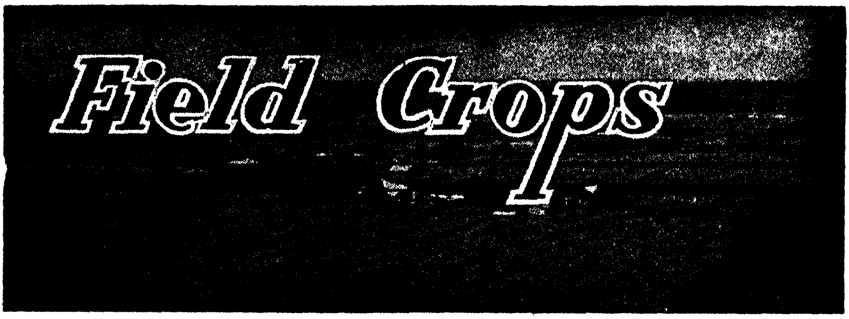
The gradual decline in the carrying capacity of even the richest lands through the lowering of soil fertility, through impaction by heavy stocking and through old pasture swards becoming root-bound has made fodder conservation a necessity on most farms in dairying districts. A similar condition has developed in respect of native pastures, largely as a result of over-stocking. Animals naturally eat out the more nutritious and palatable of native grasses.

With financial assistance and expert guidance available, there is no reason why fodder conservation should not be a regular practice on every stock farm in the State. It is obvious that intensive education on the principles and practice of fodder storage must be continuous. If it were more widely appreciated how effectively and cheaply silage can be conserved in the less costly silos there, surely, would be no necessity for an educational campaign.

Livestock must return a profit for the food eaten. If fodder has to be bought at drought prices for any length of time, few classes of stock would repay the outlay. It so happens, however, that the fodder necessary to keep farm animals in health and condition is usually the cheapest to grow and conserve.

Fodder conservation may be divided broadly into two sections:—Storage of enough cheaply-grown fodder to maintain stock in health; and storage of enough high-quality fodder to provide both a maintenance and production ration.

Perhaps, the solution of our recurring fodder shortage problem may lie in co-operative effort among groups of farmers and co-operative use of suitable labour-saving machinery for fodder crop cultivation, harvesting, and conservation. In the extension of the co-operative idea, State departments will assuredly assist.



Soil Conservation and Erosion Prevention.

R. E. HASELER, Adviser in Agriculture.

EROSION, or wearing away of the earth's crust, has gone on ever since wind blew and rain fell. It is evident that any agency which moves across or through loose or lightly anchored matter must tend to cause it also to move. Even before man removed the anchors and increased the looseness of the earth's crust, the more or less granular surface of disintegrating rock, especially on sloping surfaces with the absence of other holding agencies, moved in the direction of gravitational pull, and other forces such as wind and flowing water moving over this lightly anchored matter tended to accelerate its movement. Therefore erosion, or wearing away of the earth's loose crust, is a natural phenomenon and in itself nothing to cause astonishment or concern. It is necessary, however, to formulate a plan which will stop or lessen soil damage or loss, while still allowing cultivation—that drastic loosening of the earth's crust. In studying what may be termed pre-cultivation-era erosion, it becomes obvious that in Nature nothing is left bare, for when scars are caused on the earth's surface Nature very soon draws a mantle over the bare patches.

Vegetative Cover.

Vegetative cover seems to be the only solution of erosion problems. When water runs down sloping ground during heavy rainfall, according to the volume of water and the degree of slope, there will be lesser or greater movement of matter in the pathway of this running water, and so there will be displacement of soil.

It has to be learned why under natural conditions the damage from running water is not greater, and how natural scars are healed by natural methods. In the natural scheme, the potential danger in all natural phenomena has been allowed for and provision obviously has been made to counter these possibilities. Thus we have the remarkable and astonishingly efficient soil protectors and builders, natural flora, grasses, shrubs and forests. This natural cover acts as an anchor. It is easy to conceive what would happen under torrential rainfall, even without man's complicating efforts, if there were not this natural cover. There possibly might remain torrent-riven flats, but uplands would remain nothing but bare-faced rock. This vegetative cover acts also as a cushion to take the force of heavy rainfall and to ease it on to the ground surface. It is also an obstacle to running water, thus decreasing velocity and acting as a diffuser. Also to be noted is the efficiency with which Nature can guard against serious damage while allowing natural processes to continue. The runways down from the mountains are not smooth channels, but tortuous rock, and tree-strewn drains that ease fast-moving water into less-inclined channels, and so to the river-ways and the sea; or are wide shallow runways that are protected by a cover of grasses and other growths and over which the water flows with little or no harm to the underlying earth. This is a picture of the natural vegetative cover protecting and conserving the soil layer.

However, since it has been shown that even under natural conditions there is soil loss by erosion by running water, even in spite of the striking efficiency of the natural cover, it remains to be learned how these losses are made good. Again the vegetative cover becomes the agent. Under the forest, there is a build-up of soil-improving material such as leaves and other forest debris, thus balancing what might have been lost. Under other types of cover the same action goes on. The non-perennial growths die, decompose and become incorporated in the soil. On the open lands the grass cover serves the same end and replaces material lost and builds up the soil. This, then, is the natural method of soil conservation and erosion prevention.

Renovation of Farm Lands.

All available evidence indicates that a solution of the problem of renovation of our farm lands can be achieved only by methods based on Nature's way.

A plan has been devised by the agricultural authorities of the U.S.A. and other countries on these natural principles, and the methods used are now accepted as the best solution of the problem of soil loss and farm defacement.

It will be readily appreciated that whatever the slope, the cleaner and smoother the surface the faster the run-off. Apart from the fact that running water causes erosion, the faster water moves over the ground surface, the proportionately lesser amount of moisture enters the soil, so the primary requirement is that the rate of movement of flowing water on sloping ground be reduced. To do this presents no very great difficulties. The problem is how to do it in a way which will least interfere with the present productive capacity of a given piece of ground, a farm, a locality, or a country. Since, by the nature of tillage requirements, it is not possible to solve our problems the perfect way—by complete and permanent vegetative cover—methods have to be formulated which may be expected to give the desired results.

The first endeavour should be to protect existing cultivated fields from water flowing from slopes above the tilled area. Without this primary work, work that had been put down in the field itself might easily become badly impaired, if not destroyed, by onrush of water from above. Since, to prevent erosion, the chief concern is lessening the velocity of running water, the logical point for commencing work is as close to the top of the slope as is practicable. Here the terrain and topography will decide the best set-out for any work. In light and moderate rainfall regions it will be apparent that the chief requirement is that as great a proportion as possible of the total fall penetrates into the ground and efforts should be directed more to slowing down than to diverting run-off. The work to be done on slopes can be considered as a series of hurdles placed in the path of running water to slow it up, but not to stop it. Since, however, there are periods of rainfall of such intensity that the ground surface is incapable of absorbing more than a small proportion of the total fall, provision invariably has to be made for handling this surplus run-off.

Prevention of Rapid Run-off.

The details of a plan for any particular farm can be worked out only on the spot, but anyone with a knowledge of the principles involved and recognising the necessity of adhering to these principles, can attack most problems with confidence. The aim should be to plan for the period of greatest intensity of rainfall; devise the works that will best cope with the flow at this period; construct checking and stopping works so strongly that there will be no fear of break, and to construct diversion ditches to such a capacity that there will be no doubt that they will carry the flow at the heavy rainfall period.

It is necessary to consider again the sloping country above cultivated land. From as near to the top of the slope as appears necessary checking works, called contour furrows, may be ploughed, and continued at intervals, the spacing to be decided by the degree of slope to the head of the cultivated field. These artificial low ridges will not only have the effect of considerably slowing down flow, but will also increase surface absorption, thus giving a twofold benefit.

Besides this hillside work, it may be necessary to construct further work for the protection of the field below. This should be designed to divert flow by a diverson ditch. Dimensions will be according to amount of water which is to be checked and diverted. As actual risk is involved in any work designed to stop and divert flow of water, this phase of the general rehabilitation plan requires careful consideration. When setting out this type of work, the possibility of danger from the new work needs to be kept clearly in mind. Under natural conditions, as has been shown, there is not only minimum velocity of flow, but there is also most efficient diffusion. When the natural cover is removed the velocity of flow not only is increased, but diffusion is reduced to the extent that the water moves in channel-cutting streams. Thus in the matter of diverting flow, water that moves more or less on a "face" of greater or lesser width is directed into a stream. There is no great risk in doing this, provided, firstly, the ditch structure is of dimensions which the rainfall intensity demands and can be depended on to carry the anticipated volume; and, secondly, that the ditch has been graded to allow only slow movement to the outlet. The questions then arise: how far can this easy grade be carried; and to what point is it intended to carry the water? These two questions indicate the risk inherent in any plan which requires diversion of flow. If care is not taken to plan the whole work, preferably starting from the proposed outlet, and making sure of complete control over flow from the diversion point to final outlet, trouble greater than that which it was desired to avert may easily arise.

Soil Conservation.

Means have to be considered for preventing or lessening soil loss and increasing moisture penetration on sloping cropped land. It is assumed that full protection from outside run-off has been provided. A plan has to be formulated for the management and working of sloping ground which will best ensure the conservation of soil and fertility. Since it is recognised that permanent vegetative cover provides the surest method of holding the ground surface, any system for using and cropping sloping ground should have this fact as the basis of the plan. There obviously has to be a modification of the permanency aspect where land is to be tilled and cropped, but the modification, although away from permanency of cover, should, in any substitution, have some capacity for performing the functions of the displaced permanent cover. Without this, there can be no great efficiency in any conservation plan.

Plans for different topographical and climatic conditions obviously will differ in some details, but with the exception of districts which have a heavy rainfall the principles will remain the same. Again, the directing factors will be the volume of flow at the time of greatest intensity of rainfall; the grade of slope which has to be protected from this volume of flow; and the soil type and its condition. As these factors vary so will the method of tillage, the system of cropping, and the kind of engineering work differ; but the conservation plan must be such that the flow of water is so checked that there is only a minimum displacement of soil.

American experience has shown that where it is necessary to loosen the ground on slopes for the growing of crops, systems of tillage and cropping in themselves are not sufficient to ensure the required degree of conservation. Works of an engineering nature are necessary and check-banks or "terraces" across sloping ground should be devised.

Terracing.

Terracing has long been practised in the older countries, and the dimensions and structure of terraces have not altered much in their evolution. Terraces have proved of high value and, it would seem, are indispensable on sloping ground which is cropped. Modern use has indicated that there needs to be a definite relation between spacing of terraces and the degree of slope on which they are placed. Terracing then becomes part of permanent cover to check flow. Terraces should, however, do more than check; they should stop flow. This is the reason for the necessity of a calculated spacing as the height of the bank and the space between banks should take care of the amount of water which falls during heavy downpours. Certainly, crops growing on the inter-spaces will contribute their assistance, but the margin of safety is greater if calculations are made without taking growing crops into account. It is most important not to have ground in bare fallow at time of known wet periods.

Spacing of Terraces.

As already indicated, spacing of terraces is relative to rain intensity, but experience in other countries shows that there is a reasonable margin of safety, especially when care is taken to have the land under crop at the time of heaviest rainfall, if the following spacings are made:—On a 5 per cent. slope (5 ft. in 100 ft.), a terrace is required each 3 ft. drop, that is 60 ft. apart; a 10 per cent. slope a terrace is required at 4 ft. drop of slope, or 40 ft.; and on a 15 per cent. slope spacing of terraces is at each 5 ft. drop, or at 33 ft. intervals. The terrace placed according to this rule need be no more than 12 to 15 ft. wide and at its ridge 12 to 15 in. in height. For the greatest degree of efficiency, all future work of cultivation and cropping should conform to the line of the terraces; but if it is inconvenient to do this and it is found necessary to cross the terraces, great care should be taken to see that the form and height of the terrace is not impaired, or if impaired is quickly repaired. This form of protection of sloping fields, if the works are laid down with the necessary care and are as carefully maintained, can give most gratifying results in comparison with those obtained when working the field as a smooth plane, even if tillage and cropping methods remain the same as were practised on the smooth slope.

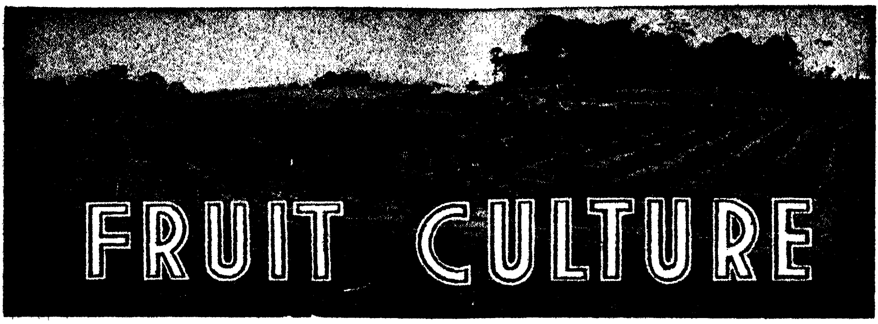
Without some additional care, however, full protection is not assured. The primary idea of terracing is to guarantee that, as probably was the case when the slope had its natural cover, there shall be no run of water down the full length of the field. The whole idea of terracing is defeated if this has not been achieved. But it will become apparent that on the slope between the embankments there will be movement of water after heavy rain and that there will be some movement of soil particles. Therefore, it is strongly recommended that tillage and cropping methods be used which will reduce this soil movement as much as possible. The ground should be worked and planted to conform with the line of the terraces. In other words, contour farming should be practised. Following the contour in working and planting means that lines of small dams are always across the path of moving water, thus water as well as soil is held in the position where it will do most good. As well as planting all row crops on the contour, strips of broadcast crops should be planted at intervals.

Crop Planting.

In preparing ground for planting, it is wise to leave the surface on the rough side, and if the seed requires a fine seed-bed the reduction to fineness should be delayed as long as practicable.

Plant residues such as trash and stubble should not be destroyed or completely covered. Where there is a high content of organic matter in the surface layer or on the surface there will be greater absorption of water, and the greater the absorption the less the run-off. This organic matter content of the soil is as important in the erosion prevention scheme as it is for the building up of fertility, and a rotation including a crop to be ploughed in should be in the cropping plan.

The idea of bringing a plan for soil conservation into action need arouse no misgivings in the mind of any farmer of sloping land. The smallest effort, if done with proper care, will give immediate benefit, and if the work is directed to tilled fields so that further wastage of these fields is stopped, the tale of worn-out farms will come to have no meaning.



FRUIT CULTURE

The Use of Borax on Waltham Cross Grapes in the Stanthorpe District.

F. A. L. JARDINE, Adviser in Horticulture.

ONE of the most important troubles with which viticulturists in the Stanthorpe district have to contend is the failure of many vines to set bunches of normally sized fruits. The type of trouble is, of course, by no means confined to the growers in this area and, indeed, in many grape-growing countries such failures are a major factor, particularly in certain seasons. This failure to set normal fruit is sometimes associated with disturbed weather conditions at or near blossom time. For example, continued rain or a sudden change in temperature at time of setting will often be followed by a reduction in the number of normally developed bunches of even-sized berries. At the same time the damage caused by insects, such as thrips, may have far-reaching effects on the subsequent history of the bunch.

Whilst any variety may be affected in this way some are obviously more disturbed by adverse conditions than are others, and thus such well known and potentially valuable varieties as Black Prince, White Wax, and Henab Turki have virtually disappeared from Stanthorpe vineyards, so regular has been their failure to produce bunches which can command a reasonable price on the fresh fruit market.

HEN AND CHICKEN DISORDER.

Apart from the type of failure of which the cause can be found in climatic or more or less obvious factors there is one in particular in the Stanthorpe district which cannot be attributed to such causes. This condition, known locally as "hen and chickens," is a most serious disorder in certain varieties, particularly the Waltham Cross. This variety is one of the most popular table grapes grown in this State and the frequency with which many vines fail to produce normal bunches is of great concern to Stanthorpe growers. In place of the normal bunch of large, evenly developed berries, many vines habitually produce a large proportion of "hen and chickens" bunches. This term aptly describes the affected bunches as will be seen by reference to Plate 23. In this plate is shown a badly affected bunch carrying a small number of normal-sized berries ("hens"), whilst the bulk of the bunch is made up of undersized worthless fruits ("chickens") resembling currants and most of which are less than half the size of normal fruit. The whole bunch ripens normally but, of course, its market value is always seriously reduced.

Early Experimental Work.

In endeavouring to find the cause of the trouble the Waltham Cross variety was selected for the experimental work and trials with this variety were carried out over a period of some eight years. These trials included examination of the effects of various fertilizer dressings, application of lime, the raising of atmospheric temperature in the vicinity of individual vines during and just prior to the blossoming period, and the protection from sudden changes in temperature by encasing the bunches in cellophane bags. The effects of cincturing and various methods of pruning were also examined. However, the results of none of these gave any indication as to the cause of the trouble.

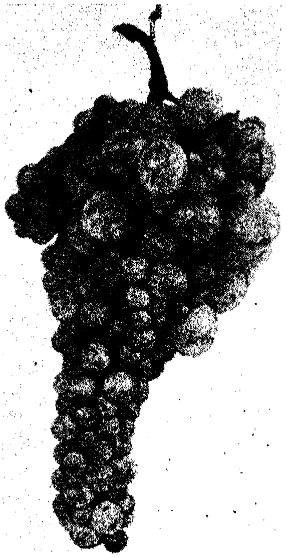


Plate 23.
Showing a Badly Set Bunch, Unsuitable for Market.

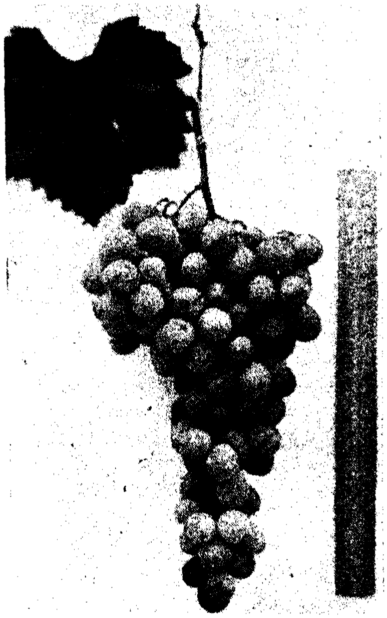


Plate 24.
Showing a Perfectly Set Bunch of Waltham Cross Variety.

Trials with Borax.

By 1937 it had been established that a number of other species of fruit trees in the district were suffering from deficiencies of certain trace elements, and it was clear that the soils of the district, all of which are of the same granitic origin, were markedly low in several of these trace elements. It was, therefore, decided to test the effects of applications of some of these on the setting and development of Waltham Cross grapes. Accordingly, in September of that year borax was applied as a soil dressing to vines of this variety which had persistently set "hen and chicken" bunches over a period of years. Vines growing in each of several types of soil were selected and each vine received an application of 7 oz. of powdered borax spread evenly and chipped into the soil, covering the root spread in each case. This dosage proved excessive, for in those instances where there was abundant soil moisture the vines were so badly injured that they eventually died, whilst those on dry slopes were also severely damaged and lost most or all of their foliage. Nevertheless, the treatment at once showed promise for where bunches appeared they were composed wholly of normally sized fruit.

The following year and each successive summer, including the 1943-4 season, the vines that survived the initial application of borax set bunches of normally sized berries of high market value.

In the second season following the initial application it became evident that borax as a soil dressing had a marked beneficial effect on the setting of Waltham Cross grapes in the vineyards of the Stanthorpe district, and consequently it was decided to lay down more extensive and detailed trials with borax.

The specific points on which it was hoped to obtain information were:—(1) methods of application; (2) the quantity of borax required for each method of application; and (3) the period over which the treatment is effective.

The methods of application and amounts appear in the Tables 1 and 2.

The effects of treatments on yields of twenty-four (24) vines of Waltham Cross variety.

TABLE 1.

FOLIAGE SPRAY (MINIMUM STRENGTH) AND SWABBING.

——	Unaffected.		Less than 50 Per Cent. Affected.		More than 50 Per Cent. Affected.	
	Number of Bunches.	Yield in Lb.	Number of Bunches.	Yield in Lb.	Number of Bunches.	Yield in Lb.
1. Foliage Spray (1 lb. Borax to 100 galls. water) ..	785	524	171	86·5	103	27·5
2. Swabbing Mixture (1 lb. Borax to 100 galls. water)	638	438	188	96·0	189	43·5
3. Control—No Treatment..	659	471	143	77·0	148	32·0

TABLE 2.

SOIL TREATMENT AND FOLIAGE SPRAY (MAXIMUM STRENGTH).

(The Effects of Treatments on Yields of 24 Vines of Waltham Cross Variety).

——	Unaffected.		Less than 50 Per Cent. Affected.		More than 50 Per Cent. Affected.	
	Number of Bunches.	Yield in Lb.	Number of Bunches.	Yield in Lb.	Number of Bunches.	Yield in Lb.
1. Soil Dressing (1 oz. Borax per Vine)	527	205·5	8	2·0	0	0
2. Soil Dressing (3 oz. Borax per Vine)	606	242·5	5	2·5	0	0
3. Foliage Spray (1 lb. Borax to 20 galls. Water) ..	695	283·0	6	2·0	0	0
4. Control—No Treatment..	452	158·5	58	17·5	35	6·0

Plate 25.
Showing an Untreated Waltham Cross Vine, the Crop Ruined by Faulty Setting.

Notes on Treatments and Results.

Foliage Spray.

The spray was applied as a fine mist at high pressure covering as much as possible of the leaf surface of the vine. This treatment, with minimum strength (1 lb. to 100 gallons), produced results immediately following application on 29th October and was effective for one season only. Sprays of maximum strength showed results during the season following the application on 21st October and were effective for one season only.

Plate 26.
Showing a Waltham Cross Vine that Received a Soil Dressing of 2 oz. of Borax.—Note the well-filled bunches.

It will be noted that the more concentrated borax solution used in the experiment recorded in Table 2 produced a far more effective control than the weaker solution used in the other experiment recorded in Table 1.

Soil Treatment.

In the case of the experimental plots, the borax was worked into the soil by means of a hand hoe. Where larger areas of vines are to be treated, however, a scuffler or harrows would be more suitable for the purpose. This treatment produced results during the season directly following the application applied on 9th September. It will be noted that 3 oz. of borax gave only slightly better results than 1 oz. per vine. One-half of the amount of the borax was applied to each side of the vine in an area commencing 1 foot from the trunk of the vine and extending to the centre of the avenue.

This treatment will probably remain effective for at least three years, but further information on how long this treatment is effective has yet to be obtained.

Swabbing.

The solution was applied by means of a small mop to the freshly-made cuts directly a vine had been completely pruned.

The results of this experiment showed no evidence that swabbing with a solution of borax at a strength of 1 lb. to 100 gallons of water produced a satisfactory degree of control. However, further investigations into swabbing with more concentrated solutions are required before it can be determined whether the swabbing method is unsatisfactory.

Though none of the borax treatments has completely controlled the disorder of "hen and chickens," there is evidence of effective control with foliage sprays and soil treatments with borax, although there appears to be no significant difference between these two treatments.

Recommendations.

In view of the possibility of rain falling shortly after spraying, thereby necessitating a second treatment, soil dressings of borax are preferred to sprays for the control of the "hen and chickens" disorder in Waltham Cross grapes. In the Stanthorpe district, powdered borax, as a soil dressing, at the rate of 1 oz. to 2 oz. per vine, according to the age of the vine, is recommended and it should be applied, preferably, during the month of August.

Where a foliage spray is favoured by the grower, a solution of 1 lb. of powdered borax in 20 gallons of water is recommended, and it should be applied approximately three weeks prior to blossoming. This will normally occur in early November, but will vary with seasonal conditions, location, date of pruning, &c.

Warning.

It is particularly stressed that borax used in excess quantities is toxic to the vines and, therefore, growers are warned against using quantities greater than those recommended.

Acknowledgments.

For their helpful co-operation in making vines available for test purposes thanks are due to Messrs. J. Blanch, N. Collins, J. Ferris, H. Nahrung, and W. Sandison, growers in the Glen Aplin area.

ANT PROTECTIO

Lucerne Pests.

H. JARVIS, Entomologist, and J. HAROLD SMITH, Officer in Charge, Science Branch.

LUCERNE is a valuable fodder crop which is grown extensively in Queensland both with and without irrigation. Many farmers are therefore familiar with at least some of the insects associated with it, chief among which are cutworms, leaf roller, jassids, corn earn worm, crown borer and seed wasp. The importance of these pests varies from district to district according to the farming practices in each and they may claim the attention of the farmer at any time from planting onwards.

CUTWORMS.

A critical period in the life of the lucerne crop occurs during the first three months after planting. In some parts of the State, particularly in the far north, partial or complete failure of the young stand may be encountered and, when investigated, cutworms may be found to be the primary cause of the failure. The damage appears shortly after germination, the death of seedlings in patches throughout the field being a typical symptom. The cutworms (Plate 27) can then be located in the soil, and are particularly numerous around plants at the margin of the affected areas. The seedlings show both leaf injury and damage to the stem just below ground level and the affected areas extend very rapidly.

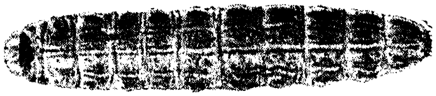


Plate 27.
Brown Cutworm × 2.
[*Drawing by William Manley.*

Life History and Habits.

A number of large, heavy-bodied moths* are implicated in cutworm damage to lucerne. These have similar habits, and the most important of them, the brown cutworm†, may be regarded as a typical example. The parent moth of this species has a wing-spread of one and a-half inches, the forewings being dark-brown in colour with blotched, darker areas. The hind wings are light-grey and tend towards brown at the margins. These moths usually lay small, globular eggs in groups on the soil and sometimes on the stems and leaves of low-growing plants. From these eggs, small whitish caterpillars emerge and commence to feed on weeds and cultivated plants. The very young cutworms feed principally on the leaves of seedlings but the older stages attack the stems below ground level; sometimes, the full-grown larvae move above ground and attack the foliage of well-established plants. Feeding generally takes place at night, the larvae sheltering in the ground during the day, hence cutworm activity is seldom detected until the plants are dying and a search is made for the insects. In about four weeks, the larvae are full-grown, greyish-green in colour and approximately one and a-half inches in length. Pupation follows and takes place in earthen cells constructed just below the surface of the ground. About two weeks later, the adult moths emerge from the brown-coloured pupae.

---

* *Euxoa radians* Gn., *Agrotis ypsilon* Roth., and *Remigia frugalis* F.

† *Euxoa radians* Gn.

The life cycle of the pest may be completed during the summer months in as short a period as five weeks and several generations occur each year. Outbreaks have been recorded in many crops but they usually attract attention in lucerne during late autumn in North Queensland; elsewhere in the State where the crop is sown in cooler weather, cutworms are of negligible importance. Weed growth is common in fallow ground during the summer months and both the eggs and larvae of the cutworms may be associated with it. When such land is cultivated in the course of preparing the seed-bed for lucerne, the immature stages of these pests are deprived of sustenance by the destruction of the weeds and they remain in the soil until the newly-sown crop germinates. Feeding may then immediately take place on the seedlings and, as many of the surviving larvae are already half-grown, they can cause a considerable amount of damage in a relatively short time.

Control.

In dealing with potential cutworm outbreaks, the lucerne grower is faced with a number of alternatives in northern districts; he may keep the areas to be planted free from weeds for some weeks before the crop is sown and thus minimize egglaying, he may apply a cutworm bait to the areas before planting and thus destroy any cutworms which may be present in the soil, or he may apply the poison bait as soon as signs of damage are observed in the field. A weed-free fallow is an excellent preparation for lucerne but it is not easy to achieve during the summer months. It is wise therefore to examine any weed-infested parts of the paddocks before seed-bed preparation begins in order to determine whether or no cutworms are present in the soil. If they are found, the bait should be distributed over the infested areas about one week before the lucerne seed is sown, a single application of the bait usually being sufficient to destroy most of the larvae. If the above precautions have not been taken, the germinating crop should be examined at intervals of two or three days during the first few months of its life and, when symptoms of cutworm activity are noticed, the poison bait must be applied immediately; a delay of even a few days can lead to a considerable extension of the affected area.

The cutworm poison bait is prepared by thoroughly mixing 25 lb. of bran and 1 lb. of Paris green. One quart of molasses is then mixed with one pint of boiling water, the mixture being thinned down to two gallons with cold water, and then added to the poisoned bran, the two being worked together until the mix gives a moist, crumbly mash which trickles easily through the fingers. The bait is broadcast over the parts of the field showing cutworm damage and also over marginal strips 20 ft. wide around them. The materials required for the work can be calculated on the assumption that the bait made from 50 lb. of dry bran will be sufficient for the treatment of one acre of ground. As the cutworms feed at night, the poisoned bait should be broadcasted during the late afternoon in order that it will be moist when the larvae are active. Lucerne is not normally grazed for some months after sowing and, though cutworm baits are poisonous, standard methods of managing the crop should eliminate any risk of injuring stock.

LEAF ROLLER.

The leaf roller is the larva of a moth* which can be found in lucerne at almost any time of the year. Normally, this pest causes little damage until shortly before flowering commences when the leaves may be tied together in clusters, each of which provides shelter for a leaf-eating, greenish caterpillar. If the outbreak continues unchecked, more and more leaves are built into the existing shelters and new ones are begun until finally little but bare stalks with numerous pear-shaped webs (Plate 28) remain in the field. Seed production may be unsatisfactory if the pest is active for faulty flowering and seed setting occur and the seed harvested may not warrant the necessary expenditure on cleaning and grading.

Plate 28.

LEAF ROLLER.—Larval shelters in which most of the leaves have been destroyed and only webbing remains.

Life History and Habits.

The parent moth (Plate 29, fig. 1) of the leaf roller measures about five-eighths of an inch across the forewings, which are "U"-shaped in outline and light-yellow in colour with irregular, dark markings; the hind wings are pale-brown. The moths usually appear in the crop when it is about half-grown and lay their minute eggs in groups on the upper surfaces of the leaves. These eggs are flat, round, almost yellow in colour, and overlap like scales. Small, whitish-yellow larvae emerge from them in a few days and each rolls a few leaves into a shelter within which it feeds. The larvae subsequently enlarge these shelters by the addition of further leaves and in four or five weeks, depending on the time of the year, they are full-grown and uniform, deep-green in colour (Plate 29, fig. 3). They then spin flimsy cocoons—one within each shelter—and pupate, the pupae being about half an inch in length and brown in colour though they gradually become darker until, just prior to the emergence of the moths, they are almost black (Plate 29, fig. 2). The pupal period lasts approximately one week during the summer and the moths emerging from the pupae escape to the open where they mate and recommence the life cycle of the insect.

---

* *Tortrix divulsana* Walk.

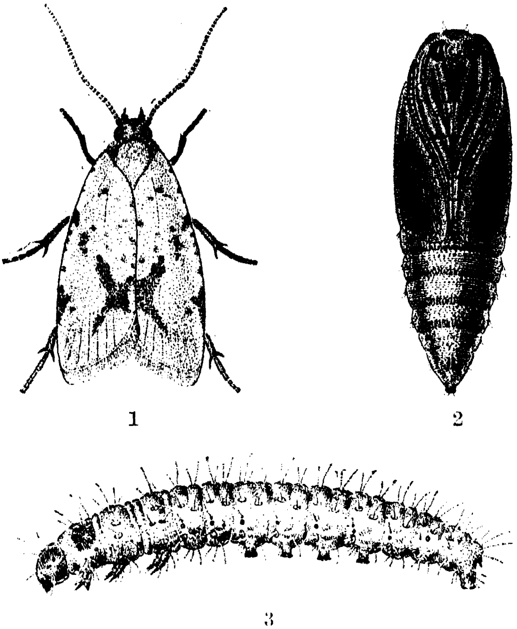


Plate 29.

LEAF ROLLER: Fig. 1—Moth × 5; Fig. 2—Larva × 6; Fig. 3—Pupa × 7.

[*Drawings by William Manley.*

This pest is particularly common in well-grown lucerne shortly before and during flowering. Severe attacks may occur in crops which, after first growing rapidly, encounter adverse conditions such as those induced by dry weather. The leaf roller is therefore more important in non-irrigated than in irrigated crops for the latter are less affected by drought or semi-drought conditions.

Control.

In lucerne, only cultural measures deserve consideration for controlling the leaf roller. In non-irrigated crops, proper management of the lucerne paddocks will suppress competing weeds, keep the soil open and permit the greatest possible utilization of the available rains, all of which tend to bring the crop to maturity before the pest gets out of hand. Where irrigation facilities are available and water is applied when the crop needs it, leaf roller should not be a serious pest if the lucerne is cut in the early stages of flowering. When a major attack does occur, the lucerne should be cut immediately even though it has not commenced to flower. Alternatively, the crop may be judiciously grazed; stock feeding on the infested lucerne destroy many of the larvae. When the leaf roller becomes less active and conditions seem favourable for rapid growth, the paddocks may be closed to stock and reserved for a hay crop.

JASSIDS.

The insects known as jassids occur on a number of crops and are commonly referred to by the farmer as "hoppers" or "fleas," names which emphasize the distinctive jumping habit of the adult stage. They may be numerous in lucerne without attracting a great deal of attention or causing any appreciable amount of damage. Not infrequently, however, jassid populations become so high and the effects of their feeding so serious that the rate of crop growth is greatly reduced and yields of hay are below reasonable expectations. Infested plants have small, white flecks on the leaves, the markings being most numerous in the more sheltered parts of the plant. Each of these white flecks marks a feeding puncture made by either an adult or immature jassid and the discoloured area of the leaf is dead or, at best, functioning very inefficiently. When most of the leaf surface is flecked, the leaf dies and falls from the plant. Severely-injured lucerne crops are stunted and have little foliage, the loss of leaf being greater in non-irrigated than in irrigated crops which continue to make growth—in spite of the presence of pest—when water is regularly applied. In the latter case, the new leafy growth compensates to some extent for the loss of foliage caused by the insects but, even so, the cut may be light. Outbreaks of jassids are more common during the spring and early summer months than at other periods of the year.

Life History and Habits.

Several species of jassids can be collected from a lucerne crop but those generally known as the lucerne jassid* and the tomato jassid† are by far the most numerous. Both are similar in appearance and habits and the following outline of the life history and habits of the tomato jassid (Plate 30) may be considered representative of the species found in lucerne. The adults are small green leafhoppers with roof-shaped wings and measure about one-sixth of an inch in length. They are very agile, and when infested plants are disturbed, hundreds of the adults catapult into the air and then settle back into the foliage within a yard or so of their original positions. The elongate-oval eggs are laid in the upper part of the stem, in the leaf stalks and the main veins of the leaves, each being placed inside the plant tissues and hidden from view. The eggs hatch in about ten days, and small, wingless nymphs

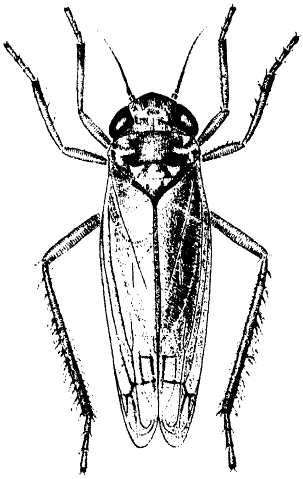


Plate 30.
TOMATO JASSID × 15.

[*Drawing by William Manley.*

---

* *Empoasca alfalfae* Ev.

† *Empoasca terra-reginae* Paoli.

force their way to the surface, leaving membranous scales at the points of emergence. Feeding takes place on the foliage from which the sap is extracted by the insect through a long beak. A white discolouration later appears at each feeding puncture and these, together with those caused by the adults, produce the typical symptoms of jassid injury. Growth proceeds through a series of moults and nymphal development is completed in approximately two weeks during warm weather, when insects grow very quickly and populations rapidly increase.

The incidence of the two more important jassids in the lucerne crop depends largely on the availability of their favoured host plants in the district. If legumes are grown extensively, the lucerne jassid will probably predominate; if, on the other hand, potatoes or tomatoes are the principal crops in the locality, large numbers of the tomato jassid may spill over from these into adjacent lucerne when the crops in which they normally occur have ceased to grow. Most species of jassids found in lucerne can subsist on a wide range of host plants.

Control.

The use of insecticides on an economic scale in jassid-infested lucerne is quite impracticable and methods of handling infested crops are essentially cultural. When the damage is already extensive, the crop may be cut for hay or grazed in order to use the fodder before further deterioration occurs; the regrowth may then escape severe infestation if rain falls and stimulates the growth of both the lucerne and any weeds in adjacent areas on which the jassids feed. When the farm is equipped with irrigation facilities, frequent applications of water will speed up the growth rate of an infested crop and minimize the damage by distributing the insect population over a greater number of leaves. In this way the lucerne may be held in reasonable condition until it has commenced to flower and is ready to cut. Jassid infestation originating in crops such as potatoes can be offset to some extent by cutting the lucerne before it shows signs of serious injury. During the spring and early summer months when jassids tend to be active in lucerne, cutting dates may need to be adjusted to the pest position rather than to the stage of growth reached by the crop, for it is better to harvest good quality hay than to defer cutting until the crop has flowered and lost most of its foliage through jassid attacks.

CORN EAR WORM.

One of the best known pests of lucerne, the corn ear worm*, also attacks crops such as tomato, tobacco, cotton, and maize. The damage is perhaps less serious in lucerne than in these other host plants because lucerne is a perennial fodder crop which recovers rapidly from even severe attacks. Outbreaks of the pest, however, may nullify attempts to produce seed for lucerne is very attractive to the pest and many crops in the flowering stage are infested by destructive larval populations. Attacks normally occur when the crop begins to flower and the larvae may then be seen feeding on the rapidly developing shoots, where they destroy the leaf and flower structures forming in the tips. If the larvae are numerous, the stems are also attacked. The most spectacular outbreaks occur in crops which are being held for seed as flower and pod damage may then be so severe that little seed sets and matures. Occasionally, the parent moths are active when alternative hosts are not available or are very few in numbers and egglaying may then take place on non-flowering crops of lucerne. The subsequent damage may be extensive. It is from such areas that migratory swarms of the corn ear worm sometimes develop and invade other crops such as cotton, maize, and sorghum where they cause a considerable amount of injury.

---

* *Heliothis armigera* Hb.

Life History and Habits.

The corn ear worm (Plate 31) is the larva of a stout-bodied moth which is not infrequently noticed in lucerne as the farmer walks through the crop. It is about one and a-half inches across the outstretched wings which are greenish-grey in colour and often tinged with red. The hind wings are creamy-yellow with a broad, smoke-coloured margin. Egglaying takes place at dusk, the eggs being placed singly on the terminals and flowering parts of the plant although if the moths are numerous, they show little preference for particular sites and eggs may be laid even on the older leaves. The globular egg is approximately one-half the size of a pin head and hatches in three to six days. If the plant is in an advanced stage of growth, the young larva feeds on the flowers and seed pods; in younger plants, stems, leaf stalks, and leaves may be attacked. Growth takes place through a series of moults until the larva is full-grown and approximately one and a-half inches in length, the colour being variable but usually green with brown, yellow, and black markings. Light and dark coloured individuals may be present on the same plant. Larval development is completed in twelve to twenty-one days during warm weather. Before pupating, the larvae descend to the ground where they construct earthen cells one or more inches below the surface and transform to the pupal stage. Later—the duration of the pupal period depends on both temperature and rainfall—the adult moths emerge. Under favourable conditions, the life cycle can be completed in four weeks and at least five generations are recorded in coastal and sub-coastal Queensland each year. Those which occur during the spring and early summer months are potentially the most dangerous to the lucerne grower.

Plate 31.
CORN EAR WORM × 2.

[*Drawing by William Manley.*

Control.

Should an outbreak of corn ear worm occur and the larvae appear numerous enough to damage the lucerne, the crop should be cut immediately for hay; delays of any kind can only result in lower yields and inferior produce. Even though the cut may be light, the loss in weight should be counterbalanced by yields from the subsequent crop which will, in all probability, escape an attack. When it is impracticable to cut the crop for hay the farmer may graze the lucerne; cattle kill many of the larvae and their characteristic habit of cropping the tips of the plants makes the lucerne much less suitable for the insect than it would otherwise be.

CROWN BORER.

The crown borer* is present in many fields of lucerne though the damage caused by this insect seldom attracts attention until it assumes serious proportions. Typically, single plants here and there in the paddock wilt and die after abortive attempts to throw out new shoots. When these plants are cut open for examination, one or more stout-bodied larvae are seen in the crown and, even if larvae are absent, tunnels filled with excreta indicate that they were present at an earlier date. Sometimes the injury caused by the pest is aggravated by rot organisms which invaded the plant when the insect damage had already become extensive. As long as only odd plants in the crop are attacked the stand is not greatly impaired. Sometimes, however, plant failure caused by the crown borer assumes more serious proportions and extensive bare patches, which soon become overgrown with weeds and unwanted grasses, appear in the field. Normally, outbreaks of the lucerne crown borer are restricted to stands which are two or more years old.

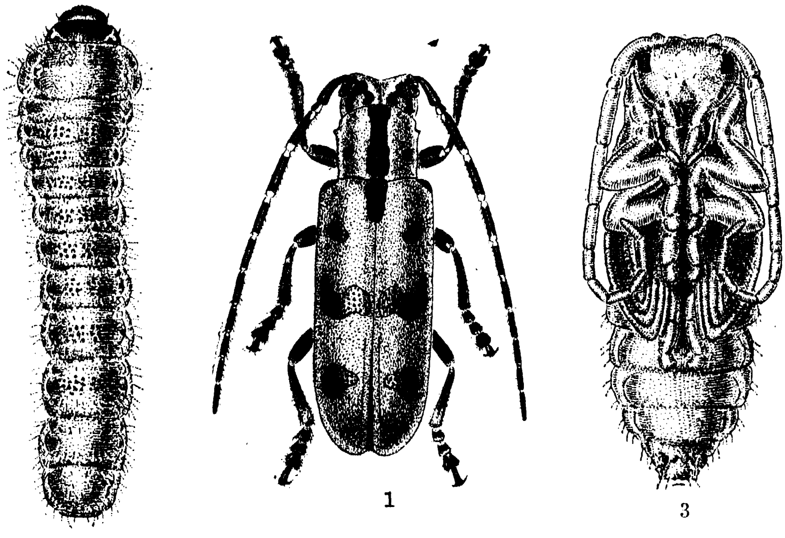


Plate 32.

CROWN BORER: Fig. 1—Adult beetle × 4; Fig. 2—Larva × 5; Fig. 3—Pupa × 5.

[*Drawings by William Manley.*

Life History and Habits.

The crown borer is a longicorn beetle (Plate 32, fig. 1) which measures approximately five-eighths of an inch in length. The wing-covers are light orange in colour with a number of black spots that sometimes merge into transverse bands in some individuals. The long antennae and legs are jet black. The eggs are presumably laid on or

---

* ***Zygrita diva*** Thomps.

in the lower part of the stem for young larvae have been found burrowing downwards through the pith. Development is slow and three or more months may elapse before the larvae are full-grown, at which stage they are white in colour and elongate in shape with the body segments separated by deep constrictions (Plate 32, fig. 2). They have the distinctive, large, rounded head of longicorn beetle larvae and are invariably found in the crown of the plant. Pupation takes place in an oval cavity at the end of the larval tunnel where the pupa (Plate 32, fig. 3) transforms into the adult beetle which finally cuts its way to the surface and escapes. The whole life cycle extends over many months and it seems unlikely that there is more than one generation each year. However, larvae of different ages can be collected from plants in the one field, and this suggests that there is no marked seasonal behaviour on the part of the insect. Though best known as a pest of lucerne, the crown borer has frequently been recorded from soy bean and two leguminous weeds, Sesbania and Crotalaria. In these hosts, larval development takes place principally in the stem, though the lower part of the feeding tunnel may extend below ground level.

Control.

Outbreaks of the crown borer are rarely sufficiently serious to warrant the consideration of insecticidal control measures. If relatively large areas in a paddock are affected, it is better to plough the lucerne out and sow another crop in the farm rotation than to attempt reseeding the bare areas. Reseeding is rarely satisfactory for the bare patches in a lucerne paddock are usually so placed that they cannot be worked down to a seedbed in which a reasonable strike can be expected.

SEED WASP.

The damage caused by the lucerne seed wasp* can be observed when the seed is being examined during threshing, for the emergence holes of the wasp are then conspicuous in many seeds while others show sunken areas which indicate that a larva is feeding inside (Plate 33). The seed wastage caused by this pest varies a great deal from year to year in those parts of Australia where the production of lucerne seed is an important industry. The insect is present in Queensland but, as lucerne is grown in the State mainly for the production of hay or for grazing, the seed wasp is of interest principally because of its bearing on the viability of seed purchased for sowing. If badly-infested seed is used when the crop is planted, the stand may be thin and patchy. The lucerne seed wasp occurs in most countries where its host plant is grown at all extensively. Clover seed may also be infested and it is possible that the insect can attack the burr clovers that are native to Australia.

Life History and Habits.

Innumerable flying adults occur in lucerne crops which have passed the flowering stage, particularly if pod formation is well advanced as would be the case in crops which are being held for seed. The wasps measure about one-sixteenth of an inch in length and are jet black in colour. The female wasps insert their pointed ovipositors through the pods and into the developing seeds where the eggs are laid. Within a few days, white, legless larvae emerge from the eggs and commence to feed inside the seeds. Larval development is completed within two or three weeks and pupation takes place inside the seed. At the close of the pupal stage, the adults emerge, bite their way through the seed coat and, if necessary, through the pods. In summer, the whole life cycle can be completed within three weeks. Larval development, however, may be slowed down when the crop is cut but may be resumed again if the unthreshed crop or the threshed seed is stored under suitably warm and moist conditions.

---

* *Bruchophagus gibbus* Boh.

Control.

The seed wasp reproduces very rapidly and attacks by the insect are seldom recognized when they occur in the field. Precautionary measures should therefore be taken by farmers who are holding lucerne crops for seed. These measures include early cutting of the seed crop and the systematic destruction of thresher screenings. Early cutting, i.e., cutting before the later-set pods are mature, tends to give good quality seed that is reasonably free from wasp damage and this is some compensation for the lighter yield obtained when the practice is adopted. The destruction of thresher screenings is a routine hygienic measure designed to destroy the very many larvae present in them.

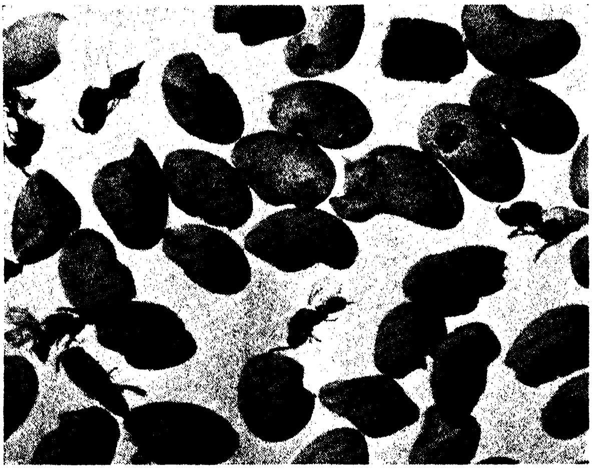


Plate 33.

LUCERNE SEED WASP.—Infested seed showing circular emergence holes of the insects and the wasps themselves × 6.

Cleaned seed should always be used when planting a crop of lucerne for, if sown in properly prepared land under suitable conditions, a reasonable strike is assured. Modern cleaning machinery, with a properly controlled air blast, separates most of the wasp-damaged from the sound seed. Uncleaned seed or seed that has been cleaned with inferior equipment, may have been infested by the lucerne seed wasp and, if used without the guidance of a germination test, may be responsible for faulty strikes in the field. It is therefore sound practice to purchase seed with guarantees of purity to type and viability.

MINOR LUCERNE PESTS.

Apart from the more important insects so far discussed, there are a number of others which occasionally attract attention.

The cotton web spinner[*] is an active, greenish caterpillar that is often found in association with corn ear worm, particularly when attacks by the latter species occur in non-flowering lucerne. This pest can be distinguished from the more important species by its habit of spinning a great deal of webbing. Control measures are the same as those outlined for the corn ear worm.

A leaf-eating beetle[†] sometimes causes injury to the foliage of lucerne crops in the central district. This insect is greenish-bronze in colour and about one-quarter of an inch in length. Though the pest is quite common, severe outbreaks in lucerne are rare and they seldom require any attention from the farmer.

The grass blue butterfly[‡] is frequently seen flying over lucerne which is approaching or has reached the flowering stage. The larvae of this insect attack cultivated beans as well as lucerne and feed on both the terminal growth and the developing pods. They are light-green in colour and slug-like in appearance. Control measures are not required in lucerne.

One of the giant mealy bugs[§] may form dense colonies at the base of the stem of lucerne and sometimes moves upwards into the leafier parts of the plant. The lucerne may die under such a concentrated attack but only occasionally is the outbreak severe enough to affect the stand.

GRAZING PRECAUTIONS.

In the foregoing account of insect pests which attack lucerne, it will be noted that the efficient use of the crop frequently involves judicious grazing. Farmers who are accustomed to grazing cattle on lucerne are well aware of the risks involved in so doing and take all necessary precautions to avoid an excessive intake of the green feed which may lead to "bloat" and even death among valuable animals. As a general rule, cattle should not be grazed on wet lucerne. In any case, the herd should always be grazed under supervision and removed from the paddock as soon as any of the animals show an inclination to lie down.

---

[*] *Loxostege affinitalis* Led.

[†] *Colaspoides foveiventris* Led.

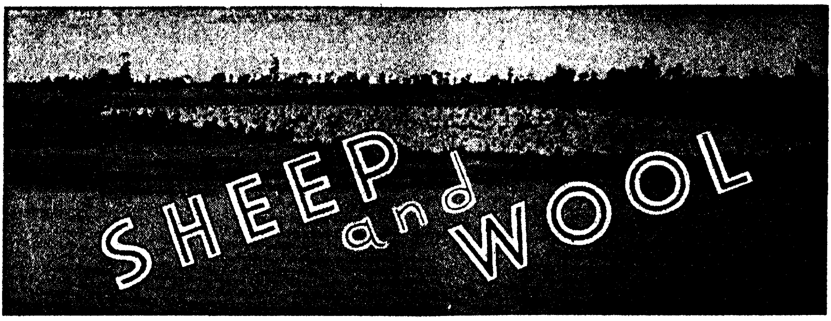
[‡] *Zizina labradus* God.

[§] *Steatococcus nudatus* Mask.

A SPECIAL RADIO SERVICE FOR FARMERS

★ ★

The COUNTRY HOUR, a special service for farmers, is broadcast DAILY through the National and Regional Stations from 12.15 to 1.15 (mid-day)



" Swelled Head " of Sheep.

(Continued from January issue.)

G. R. MOULE, Veterinary Officer, Sheep and Wool.

MALIGNANT OEDEMA, WHITE OEDEMA AND GAS GANGRENE.

MALIGNANT oedema, white oedema, and gas gangrene are three conditions which are recognised as being quite distinct, but which may cause similar symptoms of swelled head in sheep when the infection occurs in that part of the animal.

Causes.

The three conditions are caused by bacterial infection of a wound, and the organisms which have been incriminated all belong to the anaerobe family—*i.e.*, they do not thrive and multiply in an atmosphere containing oxygen. The resting or spore stage of the bacteria which cause these conditions is to be found in the soil, and the spores appear to be particularly plentiful in areas which are contaminated with animal manure, such as old sheep yards and shearing sheds. On gaining entrance to the animal body through damaged skin surface the bacteria multiply and form a very powerful poison which damages the tissues. On spreading through the body these poisons set up a characteristic soft swelling which pits on pressure, and which extends from the original seat of infection. Naturally, any wound on any part of the body is liable to infection by any or all of the particular bacteria which cause these diseases, but very often wounds which occur on a ram's head as the result of fighting provide the portal for infection and typical symptoms of swelled head follow.

As the swelling develops the bacteria which cause malignant oedema and gas gangrene invade the damaged tissues, and in this way the condition spreads. The bacteria which cause white oedema, however, remain localised at the original seat of infection, and as the poison they make spreads, so does the symptom of the swelling increase.

Symptoms.

The characteristic symptom most commonly noticed is a swelling involving the head and neck of the affected animals. This swelling usually involves the lips and nose, the area under the jaw, and extends down the animal's "apron." The ears and eyelids may also be swollen, and when this takes place these parts tend to droop.

The colour of the skin over the swollen area varies with the type of infection—in malignant oedema and gas gangrene it is dark-red to blackish-purple, while in white oedema it is blanched and pale white.

The swellings are "putty like" to touch and they pit on pressure, but the swellings of malignant oedema and gas gangrene are, except in the terminal stages of the disease, fairly warm to touch, while that of white oedema is inclined to be cooler than the rest of the animal's body. In addition, the bacteria which cause gas gangrene have the capacity to form some gas throughout the swelling, and when this is present a faint crackling sensation may be experienced when the swelling is manipulated. As the condition advances there may be an exudation of a blood-stained fluid from the skin surface, and the wool or hair over the affected part plucks easily and in places whole pieces of skin may tend to peel.

Affected animals segregate themselves from the rest of the flock and show the usual symptoms of depressed appetite and lassitude associated with fever.

The heart is inclined to be tumultuous in its action and the pulse is accelerated. The breathing becomes rapid and there may be some embarrassment as the result of the swelling of the soft tissues of the nose. In addition, there is sometimes a frothy blood-stained discharge from the nostrils of animals affected with malignant oedema or gas gangrene.

The usual termination of these diseases is death, and this takes place most commonly within 48-60 hours after the first symptoms are noted.

Post-Mortem Findings.

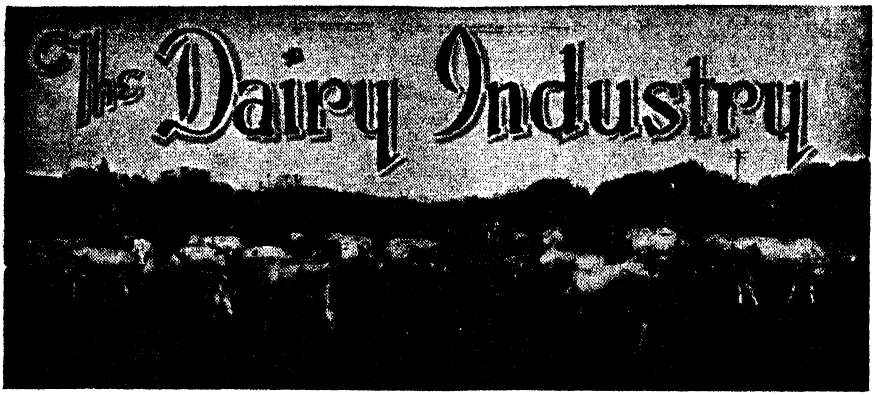
Post-mortem findings consist mainly of marked swelling, up to 2 or 3 in. thick, of the tissues under the skin, and the affected area is either dark or blood stained or clear and white in colour depending on the type of infection. There are other internal changes, but because of the virulence of the causative organism graziers are advised to refrain from carrying out post-mortems.

Treatment.

Treatment of affected animals is difficult owing to the potency of the poisons produced and to the invasive powers of the bacteria which cause these diseases. A specific antiserum can be used against each type of infection, but under field conditions it is often found that more than one kind of organism is present in the infected wound—for instance, the bacteria of malignant oedema and gas gangrene may exist together. As the work of identifying the bacteria concerned is fairly laborious, and as the animals have to be treated quickly, the antiserums are mixed in the hope of combating all three types of infection. This makes the product fairly expensive (about 8s. to treat a ram), but it is worth while when valuable stud animals are involved. In addition to the antiserum treatment, constant bathing of the affected parts with warm water is helpful.

Prevention.

When mortalities, with which swelled head of the sheep is associated, occur it is recommended that graziers seek technical assistance. It is possible by detailed laboratory tests to determine which organisms are responsible for the diseases and to vaccinate susceptible sheep. The cost of the vaccine varies, depending on the type of infection, from a little over one penny to a little over four pence per sheep.



Milk Supplies and Cheese Quality.

L. E. NICHOLS, W. J. PARK, G. R. SIGLEY, and V. J. BRIMBLECOMBE,
Division of Dairying.

SINCE 1938 an intensive campaign has been waged with a view to improving the quality of cheese manufactured in Queensland. The results of tests made of cheese factory milk supplies in the first year's work in 1938-39 have already been published (see 1 and 2 at end). Almost all cheese factories in the State have since been rebuilt or renovated, their equipment renewed, and manufacturing technique improved. At the same time, milk supplies have been regularly tested for bacteriological quality on receival at factories; field instruction also has been intensified. In 1941, action also was taken to expand cheese production in compliance with a request from the British Government for increased cheese exports from Australia. This necessitated the enlargement of many factories and the building of entirely new units in some districts, and production was almost trebled in comparison with its pre-war level.

In 1938-39, Queensland cheese factory output was approximately 5,500 tons, produced from milk supplied by 700 dairy farmers; while in 1942-43, production was 15,000 tons and the number of suppliers to factories had risen to 1,700. Since that year, there has been some diversion of supplies from cheese factories to butter factories, and the present number of suppliers is about 1,400. The production for 1944-45 was 10,100 tons.

Milk Quality.

In Table 1 the results of all methylene blue tests are subdivided into five categories, viz.:—

Quality.	Meth. Blue Test.
Poor	less than ½ hour
Unsatisfactory	less than 2 hours
Fair	less than 3½ hours
Satisfactory	less than 5½ hours
Good	over 5½ hours

This classification has been used by field officers for advisory work among producers.

TABLE I.

MODIFIED METHYLENE BLUE TESTS ON MIXED MILK SAMPLES.

Year.	Milk Samples.	Methylene Blue Test.				
		Under ½ Hour.	Under 2 Hours.	Under 3½ Hours.	Under 5½ Hours.	Over 5½ Hours.
1940–41 ..	6,417	687 10·7%	1,402 21·9%	1,652 25·8%	1,691 26·2%	985 15·4%
1941–42 ..	4,323	291 6·7%	942 21·8%	1,151 26·6%	1,374 31·8%	565 13·1%
1942–43 ..	2,974	175 5·8%	811 27·3%	772 26·0%	803 27·0%	413 13·9%
1943–44 ..	2,355	130 5·5%	543 23·0%	659 28·0%	664 28·2%	359 15·3%
Total Tests, 1940–44	16,069	1,283 8·0%	3,698 23·0%	4,234 26·3%	4,532 28·2%	2,322 14·5%

It will be noted that there has been an improvement in the proportion of milk classified in the higher grades between 1940-41 and 1943-44.

Milk Quality and Cheese Quality.

Table II. gives a comparison of the respective milk grades and official cheese grades. Milk giving a methylene blue test of two hours or more is considered as first grade milk.

TABLE II.

COMPARISON OF MILK QUALITY AND CHEESE GRADES, 1940–41 –1943–44.

Year.	Approximate Lb. Cheese Graded.	Choice and First Quality.		Second and Third Quality.	
		Milk.	Cheese.	Milk.	Cheese.
		Percentage.	Percentage.	Percentage.	Percentage.
1940–41	6,000,000	67·4	63·36	32·6	36·64
1941–42	12,000,000	71·5	73·2	28·5	26·8
1942–43	15,825,000	66·9	73·17	33·1	26·83
1943–44	12,000,000	71·5	75·65	28·5	24·35
Total	45,825,000	69·0	73·42	31·0	26·58

Although for the purpose of advisory work among producers five methylene blue test groupings were used, a reduction period of two hours was adopted in the methylene blue test for relating milk quality to cheese quality. All milk which gave a methylene blue test of not less than two hours was considered to be capable of being manufactured into cheese of either choice or first quality, while milk with a methylene blue test of less than two hours was regarded as being only suitable for manufacture into cheese of lower than first grade. All tests were carried out on samples of the mixed morning's and evening's milk on receival at the factory platform.

It will be noted there is a reasonably good agreement between the two sets of figures.

It is believed that the large number of tests, totalling 16,069 over a four-years' period, furnishes sufficient data on which to draw the conclusion that there is a definite relationship between the quality of milk, as assessed by the methylene blue test, and the quality of cheese. As a practicable standard for grading cheese factory milk supplies under Queensland conditions, a methylene blue test of at least two hours, made on mixed morning and night milk, may be tentatively fixed as a minimum standard for first grade milk.

The grading results of all cheese officially examined by State and Commonwealth grading staffs for the four years period, as shown in Table II. testify to a steady decrease in the percentage of second and third grade, with a corresponding improvement in choice and first grades. Generally cheese quality showed a slightly higher increase than milk quality over the period under review. This may be attributed to improved factory buildings and equipment and more efficient factory technique. This result, achieved with a rapidly expanding production, is creditable and indicates the support given by both factory managers and producers to the drive for higher quality.

Paying on the Basis of Bacteriological Quality.

As an encouragement to suppliers of good quality milk and as an incentive to other suppliers to improve the quality of milk produced by them, there is need for a system of payment for cheese factory milk supplies according to bacteriological quality. Such a system, if introduced in Queensland, would have a marked influence on cheese quality. The data furnished in Table II. may be construed as indicating the modified methylene blue test to be sufficiently accurate to be used as a grading test for determining the quality of milk intended for cheese manufacture. In view of the climatic conditions in this State, it is suggested that differing standards may be desirable for winter and summer months. In Table III. grade standards are suggested.

TABLE III.

SUGGESTED STANDARDS FOR GRADING CHEESE FACTORY MILK SUPPLIES.

Period.	First Grade Methylene Blue Test.	Second Grade Methylene Blue Test.
Summer (October–March)	Not less than 2 hours	Less than 2 hours
Winter (April–September)	Not less than 3 hours	Less than 3 hours

Influences on Milk Quality.

The influences of milking machines and season of the year on milk quality and, consequently, cheese quality, warrant reference in this paper.

Hand v. Machine Milking.

Table IV. summarizes the comparative percentages of farms employing hand and machine milking, respectively, in the years 1938-39 and 1943-44.

TABLE IV.

Years.	Hand Milking.		Machine Milking.	
	Number.	Percentage.	Number.	Percentage.
1938–39	381	58·35	272	41·65
1943–44	481	28·30	1,219	71·70

It will be noted that the proportion of farms on which milking machines were used among suppliers to cheese factories increased from 41.65 per cent. in 1938-39 to 71.70 per cent. in 1943-44. This increase was chiefly due to—

(*a*) The shortage of farm labour necessitating the installation of milking plants in an endeavour to maintain production;

(*b*) The change-over from butter to cheese production which, because of the large number of producers involved, considerably affected the proportion of hand and machine milking farms; and

(*c*) The effort to increase production on some farms.

The bacteriological quality of the milk on farms employing hand milking and those using milking machines is shown in Table V.

TABLE V.

RESULT OF METHYLENE BLUE TESTS OF MACHINE AND HAND PRODUCED MILK.

Period 1940–41 to 1943–44.	Tests.	Second Grade.		First Grade.		
		Under ½ Hour.	Under 2 Hours.	Under 3½ Hours.	Under 5½ Hours.	Over 5½ Hours.
Hand Milked..	5,880	404 6·9%	1,209 20·5%	1,548 26·3%	1,771 30·2%	948 16·1%
		27·4%		72·6%		
Machine Milked	10,189	879 8·6%	2,489 24·4%	2,686 26·4%	2,761 27·0%	1,374 13·5%
		33·0%		66·9%		
Total ..	16,069	1,283 8·0%	3,698 23·0%	4,234 26·4%	4,532 28·2%	2,322 14·4%
		31·0%		69·0%		

The figures in the above table suggest that the hand-produced milk was slightly superior to the machine-produced milk. This was also revealed in the earlier investigation already referred to.

Season of Year.

For the purpose of this part of the survey summer and winter periods were in conformity with the *Dairy Produce Acts* which specify the summer period to be from 1st October to 31st March and winter period from 1st April to 30th September.

Table VI. shows that milk produced in winter is of much higher quality than summer-produced milk. Both summer and winter results were treated separately for the purpose of revealing the improvement in quality which takes place when cool conditions prevail. The necessity for the installation of efficient cooling facilities on farms, as an important step in attaining high-quality milk for cheese manufacture, is clearly evident. Methods of cooling milk for cheese factory milk suppliers were discussed in the October, 1945, issue of this Journal.

TABLE VI.

EFFECT OF SEASON ON METHYLENE BLUE TESTS.

Period.	Grade Classification.	Method of Milking. Hand.	Method of Milking. Machine.
		Percentage.	Percentage.
Summer	First	61·9	54·0
	Second	38·1	46·0
Winter	First .. .. .. • ..	84·0	86·0
	Second	16·0	14·0

Quality Improvement.

A steady improvement in both milk and cheese quality has been noticeable over the past seven years. The foregoing tables show that much of the milk received and the cheese manufactured are in the borderline classification and the future affords an opportunity of lifting these products to a higher level of quality. Present world food shortages resulting from recent wartime conditions have greatly strengthened the demand for dairy products. With the lifting of the war clouds and the return to full production by dairying countries, it will be imperative for the best quality commodity to be manufactured if we are to compete successfully on the overseas markets. By herd and pasture improvement, particular care and attention to cleanliness in production, and the provision of suitable cooling and sterilizing facilities, the producer can deliver a high-quality milk. By the adoption of improved factory hygiene, the maintenance of equipment in an efficient working condition, provision of sufficient water and boiler power, thorough whey treatment, serious consideration of refrigeration, and improved factory technique, cheese factory associations can play a vital part, also, in raising cheese quality.

The services of the Officers of the Division of Dairying of the Department of Agriculture and Stock are available for instructional and follow-up work in connection with both milk and cheese quality, and associations and suppliers are requested to avail themselves fully of this service.

Summary and Conclusions.

From an examination of the results of an exhaustive survey of milk quality, assessed by the methylene blue test and official cheese gradings, the following conclusions are drawn:—

(1) There is a direct relationship between milk quality and cheese quality.

(2) There is the necessity for further improvement in milk quality as the primary factor in cheese quality.

(3) The methylene blue test may be used as a practical factory test for the determination of the quality of milk for cheese manufacture.

(4) The quality of milk and cheese produced in winter is superior to that produced in summer.

(5) The quality of milk and cheese produced in summer could be considerably improved by the adoption of efficient milk cooling on the farm and the thorough cleansing and sterilizing of all milking plants.

(6) The bacteriological standards suggested would form the basis of a system for differential payments for milk according to quality.

That both milk and cheese quality have shown improvement over the past few troublous years is a tribute to all concerned, but the future calls for further improvement which can only be attained by full co-operation between the producers, dairy associations, and departmental officers.

REFERENCES.

1. RICE, E. B., Q'ld Agricultural Journal, Nov. 1939.

2. RICE, E. B., Proceedings of Queensland Institute of Dairy Factory Managers' Conference, 1939.

◆

OATS FOR POULTRY.

Because of scarcity of supplies and the high cost usually as compared with other feeding grains, oats have not been used to any extent as a poultry food in Queensland. As a grain, fowls prefer wheat, going on a recent experiment, in which the birds were allowed to help themselves to any grain they liked. In the test 3,632 lb. of grain were consumed by 60 hens over a period of twelve months. Of that quantity of grain eaten, wheat made up 37 per cent., oats 24 per cent., maize 20 per cent., and barley 19 per cent. This suggests that very little if any difficulty would be experienced in inducing poultry to eat, to them, a strange grain.

Apart from the likes or dislikes of poultry, oats have a very good feeding value, and may be used either whole, crushed, or in mashes. As a grain oats may be used to the extent of 33 per cent. of the grain supply, or in the mash as ground oats, to the extent of 25 per cent. As a grain, however, oats should not be fed to chickens under 6 to 7 weeks old.

Oats have been proved a corrective of the vice of feather picking, which leads frequently to cannibalism, which may be a cause of great loss in the poultry pen. Feather picking seems to be more prevalent when rations do not contain sufficient bran and pollard, both of which are still difficult to obtain; most rations are consequently deficient in these ingredients.

Crushed oats may be used to build up all mashes for poultry over six weeks old.

Management of Pigs in Relation to Disease Prevention.

A. L. CLAY, Divisional Veterinary Officer.

IT is probably impossible to even estimate the percentage of pigs farrowed in Queensland which do not reach a marketable age. All competent observers, however, appear to be in agreement that the percentage is high. At all events, it can be stated definitely that it is considerably higher than it should be, and, moreover, higher than the pig industry can afford if production is to be pursued at reasonably profitable levels.

The losses, taken by and large, are invariably put down to disease; while this is largely true, it would be more correct to say that they are due indirectly to disease, and directly to errors in management. Diseases of pigs are, for the most part (more so than with any other class of stock), preventable; therefore, it can be truthfully stated that they are very often the result of faulty management. Diseases are more easily preventable by reason of the fact that pigs are marketed at a much earlier age than other classes of stock, and also because they are under direct observation at least twice daily.

Management includes all matters relating to breeding, feeding, and accommodation. Too often farmers fail to appreciate that these three things are intimately related, so much so that excellence in one department is almost useless in the absence of adequate attention to either or both of the others. It is not enough to have a "good" boar and "good" sows. Excellent as they may be, losses will occur if the feeding and/or accommodation are at fault.

BREEDING.

Having made up his mind whether he is going to cater for the pork or bacon market, and having selected a breed suitable for either purpose, the farmer should devote all his talents to obtaining and maintaining animals which are vigorous, thrifty and endowed with good constitutions.

It should be firmly realized that it is generally bad practice to buy weaners or store pigs for fattening purposes. It is a questionable practice on economic grounds; but, apart from this aspect of the matter, disease is often introduced among otherwise healthy pigs, as many a farmer can testify, to his sorrow. It is far safer to aim at keeping a clean piggery and rearing one's own pigs. If, for some reason, store pigs must be purchased, then unquestionably they should be isolated for three weeks before allowing them to run with pigs already on the farm.

Service of the Sow.

Sows are commonly served at 6-7 months. This is too early an age, and, although often no trouble apparently results, the practice can and does sometimes lead to difficulties in breeding later on in the life of the sow. Deformed or dead piglets also are sometimes seen as the result of service at too early an age, especially, be it noted, if the feeding is at fault; growth of the live pigs in the litter may be slow with resultant below-average live weights at weaning time and backward pigs thereafter. Sows should, as a general rule, not be served before 8-12 months old, depending on their development, this despite the fact that they will take the boar (if permitted) at about five months. There is no scientific evidence to support the view that fertility will be impaired by restricting breeding for a few months after the sow first becomes capable of breeding; on the contrary, the only effect on fertility is improvement.

The "heat" exhibited by sows lasts 2-3 days and its first appearance precedes the most favourable time for joining with the boar by 24-36 hours. Consequently, sows should not be served until the second day of "heat." If still in "heat" on the third day, they may be given a second service with possible advantage. Sows may exhibit "heat" about three days after farrowing, but usually do not until 3 or 4 days after their pigs are weaned; matings should be delayed until this second occasion, as heavier and healthier litters can be expected.

Maternal Qualities.

Nowadays, much more is heard than previously about sows which are good mothers, yet fail to yield sufficient milk for the needs of their offspring; also of sows which are difficult to get in pig, or which deliver small litters in which are some dead or deformed pigs. Studmasters who have concentrated on success in the show ring must accept much of the blame for this state of affairs; although, as will be seen later, haphazard methods of feeding also are involved. The milking qualities of a brood sow are of the first importance to the health of a litter. Young sows intended for breeding should be selected from among the progeny of a capable milk-producing sow; the evidence of this is a number of large healthy litters attaining an average individual live weight of about 40 lb. at weaning time. The young sow selected should have not less than 12 well-placed teats, but should not be permitted to rear more than 8 pigs in her first litter and 12 in subsequent litters. Any pigs in a litter over the numbers stated should be destroyed or put to a foster mother. The size of a litter is in a large measure hereditary, which makes it especially important that only sows from among the offspring of stock normally producing large healthy litters be used.

Hereditary Influences.

There is a variety of reasons for sows giving birth to dead and deformed pigs, but heredity again is an important influence, and it is well, if no other explanation can be found, not to breed from the offspring of such sows. The boar also may be implicated; if suspect, he can be test mated with five or six of his own daughters. This will prove him one way or the other.

If a sow is prolific and a good mother, she will pay her way up to 5 years old, so it is worth while giving a fund of care and attention to her selection in the first place.

Physical Capacity of the Boar.

The boar also is an ever-increasing source of concern to pig farmers, because of his oft-observed failure to get sows in pig, or even complete indifference to his normal role. A form of sterility in boars in which there is a certain physical inability seems likely at least in a percentage of cases to be hereditary, but most manifestations of sterility in boars can be put down to faulty management.

Boars are ready to serve at 8 months old, but only very few sows should be allowed him until he is over 10 months old. Boars are at their best from 1½ to 4 years old. Too early and too frequent service results in lack of interest, or if service is carried out, in unsuccessful matings. They vary in their vigour and number of sows which they can serve without detriment to their usefulness as breeding animals. A 12-months old boar should not have served more than 10-15 sows and never more than one in a single day. In his second year a boar may serve one sow daily, with occasionally two during a short "season." If required for service twice in one day, the first sow should be served fairly early in the morning and the second late in the day. Always use boars before feeding. They should be housed apart from sows, be well fed and exercised, for if allowed to become fat their breeding powers become seriously impaired.

If a long period of complete abstention from breeding occurs, or if only very infrequent services can be arranged, then there is some evidence to suggest that a boar's fertility may be impaired. In such cases, it may be wise to allow the boar to serve sows intended for marketing and which happen to be in "heat" shortly beforehand.

Breeding Troubles.

Finally, in regard to breeding troubles in both boars and sows, it is unfortunately necessary to give consideration to the disease known as brucellosis of swine. A similar condition in cattle is well known as contagious abortion, but this name is not suitable for the disease in pigs as actual abortion is not the most common symptom. A much more common symptom is failure to breed; sows return several times to the boar, and an affected boar may be impotent for lengthy periods. This may change from a temporary to a permanent condition with some pigs. Physical signs of the presence of this disease may be completely lacking or be restricted in sows to a whitish discharge, and in boars to an enlargement of either one or both of the testicles. There is often death from scours early in life of a large proportion of piglets in what may have appeared to be a normal litter at birth. Prevention of brucellosis requires that a farmer breed his own stores and not purchase them from other farms, unless such farms are certified as brucellosis-free. Sows should not be "sent out" for service, nor should sows be accepted for service.

This is not the whole story, but if the points mentioned are scrupulously observed, then the risk of introducing the disease into a clean herd will be reduced to a minimum. Once the disease is introduced into a herd, it can only be satisfactorily dealt with by slaughter and burning or boiling down all affected animals; these can only be determined by the application of a "blood test."

FEEDING.

It is not intended in this section to deal with what should be fed to pigs except in so far as the prevention of disease is concerned, but rather in a general way to discuss feeding methods. On the average farm, it is safe to say that the staple food for pigs is skim milk given in troughs made from hollowed-out logs. Most farmers sense, without having to be told, that such troughs are not all they might be. Despite this they often do not improve matters, countering all criticism with the statement that they cannot afford anything better. The answer to this is that they really cannot afford to be without a type of trough which represents a vast improvement on a hollowed log.

Feeding Troughs.

The hollowed log is a type of trough which is difficult to clean even when new, but with increasing age the presence of numerous cracks and crevices greatly increases the difficulty. Milk and swill soak into the gaps, putrefy and form an excellent medium for the development of germs. Some of these germs can and do produce disease, and as they mix with milk each time it is poured into the "trough," the objections are obvious. Moreover, as pigs will, if not prevented, get their feet into troughs and often deposit dung and urine therein, further objections are raised, as disease-producing agents are commonly distributed as a result. Over and above these considerations, if a farmer places a reasonable value on his labour, he will be greatly surprised at the cost of a hollowed-out log.

What then is to take the place of a hollowed log? The designs and recommendations are numerous and only broad general principles can be discussed here. Obviously, to approach the ideal they must be constructed of some impervious material, have no cracks or crannies, be capable of easy and effective cleansing, and be so designed as to prevent pigs getting into them. Concrete is undoubtedly the best material to use, but it must be well made and well finished off (smoothed), and as milk (particularly if sour) has a very destructive action on it, the trough should be treated with silicate of soda in order to resist this action. A bung hole is usually provided at one end, but as this frequently gets out of order as the trough ages, it is perhaps better to dispense with it altogether and instead have the end of the trough curved or scooped inside so that food remnants can be easily removed with a brush or broom. Wrought iron troughs also are excellent, but expensive. Galvanized iron troughs are too light and have but a limited life.

Wooden troughs can be made so as to be fairly satisfactory, provided that machine-sawn hardwood is used and they are well jointed and tarred thoroughly before use. The best of them is, however, difficult to clean, because of the absence of rounded ends.

A type of trough which is especially desirable is one in which thick curvey glazed earthenware is inset into a concrete "bed."

Whatever be the material the troughs are made from, they should be put on platforms projecting three feet either side, and have the platform, in turn, mounted on skids made of 6 x 4-inch timber so that the whole thing can be moved about from time to time. In this way, the ground in the immediate vicinity can always be kept reasonably sweet and clean. An overhead batten made of 4 x 1-inch timber, and suspended at a height of 8 to 12 inches by means of uprights at either end, will effectively keep pigs out of the trough.

Skim Milk-Feeding.

All troughs should be swilled out with cold water shortly after skim milk has been consumed by pigs. More milk than the pigs can consume in quick time should never be placed in troughs, because any surplus remaining in the troughs may quickly become sour and unhealthy.

In the handling of skim milk, the usual practice is to run off the milk from the separator into drums or vats, which often are not washed out, and rarely, if ever, properly cleansed. They become coated thickly with a most disagreeable and unhealthy scum. The milk becomes not only tainted, but often actually putrid. No farmer would think of feeding such milk to calves or to orphan foals or lambs, but for some obscure reason the pig is believed well able to withstand such an outrage on its digestive system. If farmers could only see and appreciate the extent of gastritis and bowel troubles in pigs fed on such material, they would very quickly change their ideas on the subject. There is no objection to sour milk for pigs if it has been allowed to sour under sanitary conditions, but even so, for pigs before and soon after weaning, skim milk is better if fed fresh. For older pigs, if sour milk is going to be fed it should be fed always and not mixed with fresh milk, otherwise scouring is apt to occur.

If a farmer is not prepared to clean and scald his drums, vats, buckets and troughs at regular intervals, digestive disturbances must be expected and there need be no mystery as to why the pigs are not doing as well as they might be.

Because of the great palatability of skim milk, young pigs up to a weight of about 65 lb. are apt to take more (if the supply is uncontrolled) than they can digest. One result is scours, and if the conditions are repeated, a more or less chronic state of indigestion. It is important from the standpoint of preventing scours, that skim milk be fed at regular hours and that the milk be the same "age" or degree of sourness from day to day. As a general rule, it is not advisable to feed concentrates (meat meal, maize meal etc.) and skim milk together as a slop: the milk is best fed separately and the concentrates given dry from a self feeding hopper.

One other aspect of skim milk feeding is its value as a feed in relation to disease prevention. Skim milk is an unbalanced and even troublesome food for pigs when fed alone, that is, quite apart from any consideration of the hygienic conditions under which, as has already been pointed out, it should be fed. It is too watery, (does not contain enough solid matter, excellent though the quality of that may be). The result is that in an effort to satisfy their appetites, pigs will take in much more liquid than that for which their digestive systems are designed. "Pot bellies" result, and the pigs do not make rapid gains. Feeding skim milk alone also is a wasteful practice and amounts to throwing money away, by reason of the fact that it contains more protein (belonging to the more expensive class of stock foods) then the pig requires. Most farmers would probably be greatly surprised to learn that skim milk, when fed alone to pigs, may only return them as little as ½d. a gallon, but when fed in combination with other appropriate foodstuffs it may return, under favourable conditions, as much as 3d. a gallon.

It is necessary to remember that skim milk is lacking in vitamin A (which has been removed with the cream) and has only traces of vitamin D. The former is essential for growth, and the latter for bone formation.

Vitamin Requirements.

The pig is a rapidly growing animal and unquestionably requires comparatively large supplies of vitamin A. Lack of this vitamin does not produce immediate effects, but after a period an astonishing array of symptoms may occur. This is restlessness, lack of muscular control (particularly of the limbs), stiffness, humped backs, convulsive fits, miserable appearance, cessation of growth, and eventually death; eye troubles commonly seen in other animals suffering from a deficiency of this vitamin, are infrequent. Some cases of paralysis of the hind quarters are caused by a deficiency of this vitamin. With sows, after a series of pregnancies there is irregularity in the appearance of "heat," difficulty in breeding, and perhaps abortion or the birth of dead pigs at farrowing time. Some of the dead pigs may not be delivered, but retained in the womb where they undergo partial resorption and cause subsequent sterility. Vitamin A also has an important bearing on disease of the respiratory system, e.g. pneumonia, coughs and colds, and probably also worms. Adequate amounts of this vitamin in the food renders pigs (in common with other animals) less susceptible to such complaints.

Plenty of vitamin A is present in fresh green pastures, so that if pigs are allowed access to such pastures an important step in a campaign for disease prevention will have been taken. If it is not practicable to run pigs on pasture, then fresh greenstuff (or lucerne hay) should be cut and given whenever possible. Yellow corn (but not white corn) also supplies vitamin A, but even when this is being fed, greenstuff is probably still required for best results, especially when the corn has been in store for lengthy periods.

Vitamin D has a bearing on "stiffness of the hind legs," and, in some cases, paralysis of the hindquarters. It is related to the utilization by the body of the important bone forming minerals, lime and phosphates, particularly if these, as is often the case, are not fed in proper proportion to each other. The immediate cause of many cases of paralysis of the hindquarters is now known to be fracture of a bone towards the hindmost end of the spinal column. The exciting cause is weak bone caused by a ration low or ill-balanced in minerals and vitamin D. The bones in the spinal column in such an event are unable to withstand the contraction of powerful back muscles when these are suddenly brought into play, as happens when the pig either slips, or recoils in fright.

Vitamin D is supplied to the pig by the action of the sun's rays on certain substances in the skin. It is present, though in very variable amounts, in lucerne hay, but be it noted, is lacking in fresh green pasture. In ordinary circumstances a deficiency of this vitamin need not be anticipated, particularly if the supply of minerals is adequate. In certain parts of Queensland (notably the Atherton Tableland), however, there are periods of the year when there is very little direct sunlight for weeks on end. Under such conditions, cod liver oil which is a rich source of vitamin D could with decided advantage be given in the milk, more especially to young pigs before and shortly after weaning. High-grade cod liver oils have unfortunately more than doubled in price in recent times, and moreover are now difficult to obtain in any quantity. Good quality sun-cured lucerne and clover hays are the only practicable substitutes.

Mineral Needs.

Skim milk is comparatively rich in minerals, but because of the pig's requirements of these substances the provision of a lick is notwithstanding desirable. A ration of skim milk alone, in addition to other deficiencies already mentioned, may be below desirable levels for lime. Sows which are maintained through several successive litters on a ration deficient in lime, may eventually have difficulty in farrowing and be very weak for some days afterwards. Their milk flow is poor and their udders flabby in appearance. The pigs in the litter may have rough skins and may be subject to rickets; many of them die before weaning and those which survive may always be backward. Some cases of trembling and shivering also may be traced to lack of lime.

A deficiency of lime in weaned pigs results in lack of appetite, unthriftiness, loss of perfect control over movements (leading eventually to paralysis) poor growth and poor utilization of food supplied.

For pigs, lime is more important than phosphates in a lick, largely because of the relative abundance of phosphates in cereal grains (corn, wheat, barley). In addition, cereals and mill offals (bran and pollard) are acid forming; and as the "ideal" diet should be either neutral or alkali forming, limestone (an antacid) also is valuable on that score.

Salt, contrary to popular belief, is advisable for pigs, except where swill forms the basis of the ration. It is a valuable aid to digestion and assists in the well-being of the body as a whole. A suitable mineral mixture for brood sows and growing pigs is ground limestone 4 parts, common salt 1 part, or, (if no grain or only very little is in use) ground limestone 2 parts; sterilized bone meal 2 parts; salt 1 part. If desired, it can be given in the food; for pregnant sows; one heaped dessertspoonful daily. For young pigs, the addition of clear lime water to skim milk at the rate of ½ pint to 1 gallon is excellent. It aids digestion, helps to prevent scouring and assists in the development of healthy and normal bone formation.

Rations for Pigs.

The common ration for pigs in many part of Queensland, skim milk and maize, can be improved by the substitution of meat meal for a proportion of the skim milk. This applies particularly at the time of the year when skim milk is not available in abundance. The palatabiilty of the ration is improved, resulting in higher consumption. Important also, is the fact that the supply of lime and phosphates is more adequate, and that there is, generally, a wider variety of nutrients.

A ration of maize and meat meal is improved by substituting skim milk for portion of the meat meal. There is here again greater palatability and a wider range of nutrient materials. Pigs given maize and meat meal alone may become stiff and lame, especially during winter. Access to pasture or the feeding of lucerne hay will correct this condition.

CARE OF SUCKLING PIGS.

A ration of maize alone is hopelessly inadequate either for growing or fattening pigs. It is just as unsatisfactory for pregnant sows. Even the addition of minerals does not make the ration a good one; some protein is essential.

The suckling time, often a period of prodigious losses, should, if the management of a piggery is efficient, be virtually trouble-free. For the first 24 hours after farrowing, only water should be given to the sow; she should then be gradually brought on to full feed, taking 7-10 days in the process, the idea being to bring on the milk flow in easy stages and not suddenly. This at the one time helps to prevent milk fever in the sow and scours in the sucklings (from over feeding). Suckling pigs generally draw nutriment from the same teat until weaned, so on the first day the smallest in the litter should be put to the front teats, because these secrete more milk than the teats further back. As a rule. the number of teats which remain in milk during the suckling period does not exceed the number of suckling pigs. At first, sucking is very irregular, but quite soon becomes fairly regular; about every 2 hours during the day and every four hours during the night. It may be advisable to remove the tips of the "wolf" teeth or temporary tusks which are present in newly-born pigs, as these are likely to injure the sow's udder and perhaps indirectly cause mammitis; retaliation by the sow on the offending sucklings also is avoided. The operation, if it may be so called, is easy with the cutting edge of a pair of pliers.

Young males should be castrated at 4-6 weeks in order that they will have some time to recover from the effects of the operation before being weaned. The double setback of castration and weaning at the same time should be avoided. If the pigs have to be weaned, or for some reason have not been castrated, then the operation should be delayed until a fortnight after weaning.

Food Demands of the Litter.

When about three weeks old, depending on the milk production of the sow and the average weight of the suckling pigs at birth, the demands of the litter frequently exceeds the sow's capacity to supply. Very often the sow's trough is the only source of additional supply for the sucklings. This will be empty (and should be so) except for a few minutes at each feeding time. The stomach capacity of suckling pigs is very small and therefore needs "a little and often." From three weeks onwards, a mixture of cracked grain and meat meal should be made available to the sucklings in a creep inaccessible to the sow. Needless to say, strict hygienic precautions should be taken. The trough in the creep should not be allowed to remain empty for long, otherwise gorging will occur when the trough is eventually replenished.

The live weight at weaning time is very important to the welfare of the pig in after life, much more so than is commonly realized. Creep feeding will make the desired average of 40 lb. much more easily attainable; moreover, any setbacks at weaning time will be only fleeting. Newly-weaned pigs should always be fed three times daily at first; this practice (whenever possible) should be continued until the pigs are 3-4 months old.

Health Points.

Anaemia of suckling pigs is only seen when the sow and her litter have been confined in concrete pens or wooden huts away from contact with soil. Affected pigs have poor appetites, are weak and inactive, and their breathing may be laboured; scouring also may be present. In white pigs, the usual pink colour of the ears and nose is lacking. The simplest thing to do is to turn the sow and litter out into clean pasture, as the sucklings will then eat small quantities of earth and speedily correct the trouble. If this is impracticable, small quantities of fresh soil may be put in the pen daily, or the sow's udder may be swabbed daily with a solution of commercial sulphate of iron. The solution is made by dissolving 4 oz. of the sulphate in 1 pint of warm water and adding a little treacle or molasses.

ACCOMMODATION.

Bad accommodation is often associated with incorrect feeding as a cause of disease among pigs. Under natural conditions, pigs graze at will over large areas; they drink and bathe in running streams and have ample shade when required. Compare this state of affairs with that to which domestic pigs are obliged to conform! Often they are enclosed in small yards in low-lying situations; there is little or no facility for exercise; and in wet weather the yard may become a quagmire. In addition, the dung and urine voided daily by the enclosed pigs is allowed to accumulate and, in course of time, grossly contaminate the ground. Many of the agents which cause disease are present in the excreta (this applies particularly to parasitic diseases), so that the importance of contaminated ground is obvious. Too often the same yards have been in continuous use for 20-30 years, and in such circumstances there should be no cause to wonder why pigs do not do well.

The present-day pig has for so long been reared under artificial conditions that he has lost much of his former constitution and vigour, and is accordingly affected adversely by dampness, draughts, excessive heat or cold; and more particulary by sudden changes in temperature (i.e. changeable weather). Pigs therefore require carefully planned shelter if diseases such as pneumonia, catarrh, rheumatism and paralysis are to be avoided.

Piggery Layout.

In regard to the general layout of piggeries there is not the slightest doubt that, while farmers continue to hold the view that they cannot afford the time and labour necessary to keep semi-intensive piggeries in a sanitary condition, the only solution is to give over-much larger areas to the raising of pigs than is the general custom at the present time. The grazing or paddock system represents a partial return to native conditions and has much in its favour from a hygienic point of view. There is not the same tendency for dung and urine to contaminate the ground as is the case with the semi-intensive system, so that the pigs enjoy comparative freedom from parasites; and, in addition, benefit greatly from the continuous supply of green feed. A sufficiency of exercise (particularly important with dry sows if farrowing troubles are to be avoided) also is provided. It is, however, essential to have paddocks large enough to be always well grassed, and to enable a paddock to be rested from time to time (i.e. rotational grazing). The number of pigs which can be run to the acre and allow of these considerations being fulfilled can only be determined by local experience. Wherever possible, the use of cultivated crops in addition to grass pasture should be seriously considered.

The equipment used in the paddock system should be movable by mounting the troughs and sheds on skids which can then be moved about from time to time, the ground in their immediate vicinity being in this way prevented from becoming bare and contaminated.

Where it is not possible to run pigs on the paddock system and they are perforce confined to small yards, increased attention and labour are necessary if the yards are to be kept in a sanitary condition. There should be a sufficient number of yards to enable at least one to be kept empty at all times. Under this system, when a yard becomes bare and foul from constant use it can be ploughed or dug up, limed (with advantage) and a suitable crop sown. This has the two-fold effect of purifying the soil and providing good food.

A Common Fault.

A common fault with piggeries of the semi-intensive type is to have them in level or low-lying situations. In most of these instances, the farmer has obviously allowed closeness to the dairy to be the prime consideration in selecting the piggery site.* Admittedly with piggeries of this type, proximity to the separator-room is an important consideration, but it should not be allowed to outweigh the necessity for a site which will give good drainage and thus eliminate the risk of disease from mudholes and quagmires. This does not mean that a piggery should be built on the top of a hill (the pigs would be exposed to every wind that blows), but rather on sloping or rising ground. The slope of the selected site should face in the opposite direction to that from which come the prevailing winds—e.g. on the Atherton Tableland all the weather comes from the south-east, so that there it would be a distinct advantage to be on a slope having a north-easterly aspect.

Sheds and Flooring.

The sheds used should face north-east and have an open front, allowing the morning sunlight to penetrate inside the shed. Sunlight is an effective "disinfectant." Floors should be impervious to moisture. On the average farm this is rarely the case. Earth floors are commonly used, but have many serious disadvantages. They cannot be kept level, and develop hollows which serve as receptacles for moisture and filth. They are often cold and nearly always damp, and are impossible to effectively disinfect and keep clean. In short, they are not conducive to the success in the prevention of disease.

---

* One hundred and fifty feet is the shortest distance allowed by law between a dairy and a piggery.

Wooden slabs laid on the ground are little better than earth floors. A floor made of machine-sawn hardwood is, however, quite satisfactory if closely jointed and tarred. Concrete makes the most sanitary floor, but as it is cold and hard necessitates a wooden sleeping platform.

Walls of sheds should be draught-proof with a ventilation space all round under the roofing to ensure the circulation of plenty of fresh air.

Too often the oldest timber about the farm is used in the construction of pig houses. This is false economy. Such timber provides harbour for parasites and disease-producing agents, and brings about damp, draughty conditions inside the house.

No matter what the type of house, if it is a fixture pigs will in the course of time scoop out the earth on the shady side, usually the south-east side; they lie there during the heat of the day to have the benefit of the breeze in addition to shade. Inside the house they get shade, but no breeze. It is advisable in such circumstances to place a low wooden platform on the ground where the pigs usually camp, otherwise the site may become a quagmire right alongside the house in wet weather.

If the floor of a pig shed is a raised one (if made of hardwood, it should be), another common fault is to find pigs camped under the house. This again is a most undesirable practice, as the ground under the floor does not get any sunlight and is thus apt to become a hotbed of disease. This is particularly likely to happen where the floor is not impervious and moisture and filth drop through. The space under the floor should be effectively boarded up if risk of disease from this source is to be obviated.

The boar yard should be long and narrow rather than rectangular, with the shed at one end and the feed trough away at the other. This ensures that he takes some exercise from the shed to the trough. The farrowing pen should have a guard rail or fender right round to prevent sows crushing sucklings against the wall.

Wallows, unless properly constructed of concrete, should not be tolerated. The ordinary mud wallow is a depository of filth and infection, and as such is a continuous source of risk to the health of pigs.

Shade in the Pig Yard.

Shade trees and shrubs are desirable under summer conditions in Queensland, but should only be retained on high ground. The white cedar berry tree should not be planted as the berries are poisonous to pigs. Adequate shade will do much to eliminate cases of heat stroke and apoplexy. The ordinary galvanized iron roof makes sheds too hot for pigs in the summer, and if additional shade is provided the comfort of the pigs will be much enhanced and healthier and more thrifty animals will result.

The Isolation Pen.

A very valuable addition to any piggery is a quarantine or isolation pen. The importance of isolating sick pigs at the earliest possible stage of an outbreak (or suspected outbreak) of infectious or contagious disease cannot be over-emphasised.

Too often a farmer fully appreciates the importance of isolating sick pigs, but having no quarantine or "hospital" pen is forced to just put them "over the fence." In such circumstances, the sick pigs promptly take up a position alongside the fence separating them from their former abode and the risk of further pigs becoming infected is but little reduced. It is important that drainage from the site of the isolation pen should be away from and not towards the piggery, also that the pen has a "buffer" or double fence to prevent contact between sick and healthy pigs, if the latter are at large.

Another advantage of an isolation pen is that pigs which have become lame, either through injury or some minor ailment, can be segregated and given the chance of recovering without interference by their fellows.

The isolation pen should be thoroughly cleansed and limed after each period of tenancy, otherwise disease germs may linger and infect future "patients."

PREVENTION OF PARASITIC DISEASES.

Parasitic diseases are the causes of such a large proportion of losses that they warrant some special observations, even in an article of such a general nature as this.

Reference has already been made to the fact that worm infestation arises as the result of contamination of yards and feed troughs by dung and urine from infested pigs. It is well known by farmers generally that worms cause pigs to be unthrifty and slow in growth, and are a cause of diarrhoea, wasting, and certain types of pneumonia; further, that worms may be present in one or more of the following situations, viz., stomach, bowels, lungs, liver, and kidneys. It is also generally appreciated that young pigs may die if not treated. Just by what means pigs become worm-infested is not however nearly so well understood. The position can be stated very briefly as follows:—

Worms in Pigs.

Male and female worms are present in a infested pig. The male fertilizes the female and the latter then lays eggs which are passed out in the dung of the pigs (in the case of the kidney worm in the urine). The eggs are naturally very small and can only be seen with the aid of a microscope. What they lack in size, however, they make up in numbers. The female large round worm of pigs (found in the small intestine or first portion of the bowel) is said to lay as many as 27,000,000 eggs during its lifetime. Eggs may under suitable conditions remain fertile for several years, illustrating the difficulties attending the control of these parasites.

Pigs become infested with worms by swallowing worm eggs. Knowing this, and knowing moreover that eggs are present in enormous numbers in the dung and urine, it is obvious that so long as pigs are confined in small yards they will almost certainly become infested in some degree unless a very high standard of sanitation is maintained.

Hence the necessity for regular collection and removal of dung, a drainage system that keeps the yards and sties as dry as possible, and the prevention of soiling of food and drinking water.

To Keep Young Pigs Worm-free.

A system of management for the sow and her litter designed to keep the young pigs worm-free is as follows:—A few weeks before farrowing the sow is treated for worms. When farrowing is imminent, the farrowing pen (which should have a concrete floor and sides likewise constructed of concrete for the first 12 inches) is prepared by sweeping and scraping followed by scalding with boiling water to which a little caustic soda has been added; finally a disinfectant solution is applied. The application of the disinfectant without these preliminary cleansing practices will be useless. The sow is thoroughly washed with warm soapy water, paying particular attention to the udder immediately before being put into the farrowing pen. A single small lump of dirt remaining on the sow may contain enough worm eggs to defeat the whole object of the system. If the farrowing pen is of a suitable type and the procedure outlined has been faithfully followed, then the sucklings will run very little risk of becoming infested soon after birth. As we have seen when dealing with anaemia of suckling pigs, it will be unwise to keep the sow and litter confined to the farrowing pen for any length of time unless precautions are taken. In practice, it is wise to aim at removing the sow and litter from the farrowing pen when the sucklings are 7-10 days old. They should be carted, not driven, to a pasture where no pigs have been kept for at least 12 months, or failing this to a small paddock which has been cropped since last being tenanted by pigs. The sucklings should be kept there until 4 months old, at which age they can be put into the fattening pens, as they are then much less susceptible to the effects of worms. If this system cannot be followed in its entirety (e.g., because of no suitable farrowing pen), then it should be adopted as far as practicable. Sows might, for instance, be allowed to farrow in portable colony houses in "clean" pasture.

If comparative freedom from worms is to be attained, it seems inevitable under Queensland conditions that, at least so far as the average farmer is concerned, the semi-intensive system of pig raising should give way to the paddock system.

External Parasites.

Of the external parasites, lice are the commonest and are prevalent throughout the State. Although farmers are generally quite conversant with measures to control them, the ill-effects arising from lice infestation are not fully realized and it is emphasised that the presence of lice is opposed to the production of thrifty, early maturing pigs. The parasites cause constant skin irritation and often, because of scratching and rubbing, the skin becomes raw and may be infected. The ill effects then become obvious, but it is the reduced rate of growth, caused by continued irritation before the skin becomes raw and bleeding, which has to be kept in mind.

CONCLUSIONS.

It seems to be a tradition among many farmers that pigs can be successfully raised amidst dirt and filth on any food that is offering, no matter how sour or unbalanced it may be. Such an attitude is difficult to understand. It is certainly not correct, and to the farmer who claims to get good results in such circumstances all that can be said is that the day will come when he will experience serious mortalities.

Over and above this, it can be stated with certainty that with improved management he would market a very much higher percentage of pigs born on the farm and at much greater profit to himself. The average farmer would almost certainly be greatly surprised were he to keep accurate records of pigs born on the farm and pigs marketed as porkers or baconers. In some cases, the latter would be barely 50 per cent.

Given a fraction of the attention and forethought accorded to the rearing of calves, foals, or lambs, the pig would more than hold his own. As it is, losses in the pig industry from disease are high. That this state of affairs is consequent on mismanagement and not because of natural difficulties in the rearing of pigs, all farmers can easily prove for themselves.

It can be done, simply by giving the pig a greater share of consideration in the activities of the farm, as a whole, than has hitherto been accorded.

Ear Notching of Pigs.

C. R. GRIEVE, Assistant Adviser in Pig Raising.

BEFORE a litter is weaned, the young pigs should be given a permanent identification mark. Tattooing, tagging, and ear notching are common methods of identification, but of these the lastmentioned is undoubtedly the best and as nearly permanent as possible. Notching has the advantage over tattooing in that it can be used on all breeds of pigs and, if neatly done, remains legible regardless of the pig's age. A pig's number also can be observed in the paddock without the necessity of yarding the animal and perhaps washing its ear.

Tattooing, however, is the only method of ear marking officially recognised by the Australian Stud Pig Breeders' Society for the identification of Large White and Mid White pigs. Nevertheless, it is definitely advantageous also to ear-notch these breeds for the reasons stated.

Metal tags are not satisfactory as they are often lost through pigs fighting or rubbing their ears against fences, or other objects. With this method, also, the pig has to be yarded and the tags cleansed before the number can be read.

It is not claimed that ear notching is the perfect system of identification, for it is realised that pigs may occasionally tear their ears through fighting, thus marring the notches; their ears also may be disfigured by excessively deep and careless notching.

However, these risks may be reduced to a minimum if the following points are observed.

1. No marks should be placed from the middle to the base of the upper edge of the ear. To make notches in this position it is necessary to cut deeply into the cartilage to ensure that the notches will not grow out as the pigs age. This means that there is always a danger of causing the ear to break over and droop in an unsightly manner—a very objectionable feature especially in show stock.

2. The value or number allotted to positions near the point of the ear should be so designed that it is not necessary to take out more than one notch in this part of the ear for any number; otherwise the tip of the ear may droop.

3. Round punch holes should not be used near the tip of the ear where they are most likely to be torn.

4. Pieces removed from the ear should vary according to the size of the pig—avoid cutting veins where possible.

The ear notching system illustrated in Plate 34 has been designed to avoid the above faults as far as possible and is one example of the many systems in which notches in particular positions of the ears represent numbers, enabling each pig or each litter to carry a different number. A brief description of this system which employs both ears for notching is as follows:—

All unit numbers are placed on the right ear and the tens in the left or near ear. Confusion between the two may be avoided by observing that the words unit and right each contain the letter "i" and the words ten and left the letter "e."

It will be noted that numbers 1, 2, 4, and 7 are recorded by a single notch, their value being determined by the relative position on the ear. Numbers 3, 5, 6, 8, and 9 represent a combination of the previous positions, e.g., 2 and 1 to make 3; 4 and 1 to make 5; 4 and 2 to make 6, and so on. For these numbers it is therefore necessary to make two notches.

The tens are represented by notches in the left ear, the 10, 20, 40 and 70 positions corresponding to the 1, 2, 4 and 7 positions respectively in the right ear.

Any number up to 99 may thus be made by a combination of the above figures. If it is necessary to number beyond 99, round punch holes could be used as shown in the diagram, but in the average herd, where all pigs in the litter are given the same number as the dam, it is usually unnecessary to go beyond 99. By adopting the 1, 2, 4, 7 combination the number of cuts in the ear is reduced to a minimum.

RIGHT EAR—UNITS.
LEFT EAR—TENS.

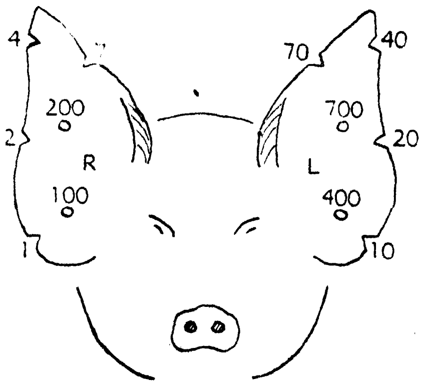


Plate 34.
THE KEY OR GUIDE OF EAR-MARKING SYSTEM.

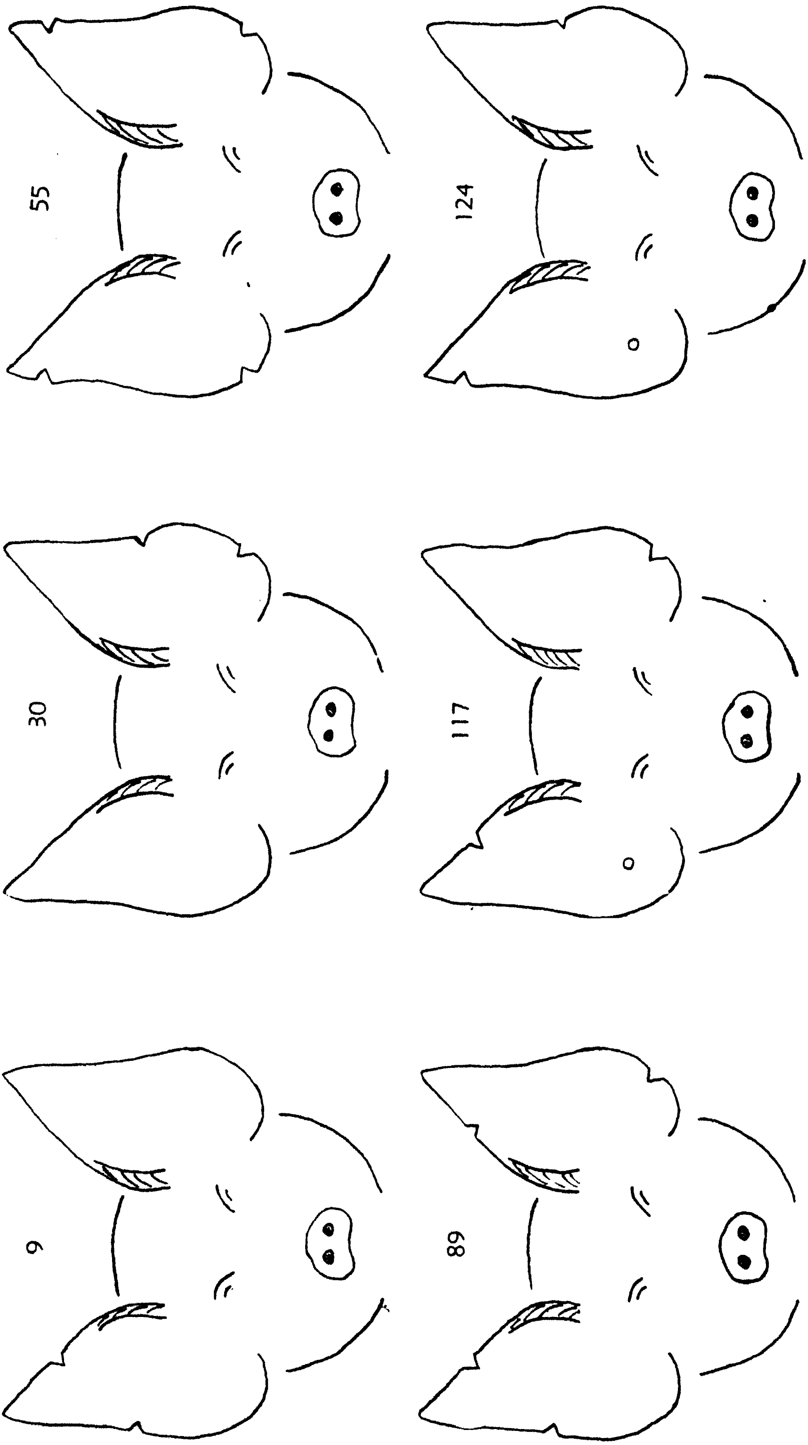


Plate 35.
Illustrations Taken at Random.

SOW'S BREEDING RECORD.

Name of Sow : "Sunnybrook Pearl XVI."
Breed : Large White.

Date of Farrowing : 3-7-38.
Earmark No. 65.

Sire : "Sunnybrook Major II." Earmark : 32
Dam : "Sunnybrook Gem V." Earmark : 12

Litter Farrowed—	Sire of Litter.	Number in Litter.		Died at Birth.		Date of Deaths before Weaning.		Earmark and Date Weaned.		Disposal of Litter. Date of Deaths after Weaning.		Sold to Market.								Remarks.
		Boars.	Sows.	Boars.	Sows.	Boars.	Sows.			Boars.	Sows.	Date.	Number. Boars.	Number. Sows.	Average Weight.	Price.	Gross Return.			
															Lb.	d.	£	s.	d.	
2-9-40	Sunnybrook Major	7	5	1	1	..	1 3-10-40	65 29-10-41		..	..	28-3-41	5	2	140	9	36	15	0	1 pig born dead
																9	5	2	3	1 pig overlain
								Boars.	Sows.	..	..	10-4-41	1	1	136	8¼	4	16	9	1 death——pneumonia
								6	3											
																				8 baconers 1st grade; 1 2nd grade
																	46	14	0	

As the position of the notch on the ear determines its value it is important that positions 1 and 10, and 4 and 40 be kept well towards the bottom and the tip of the ear respectively, to prevent being confused with the positions 2 and 20 in the middle of the ear.

Pliers with a Λ shaped cutting piece are recommended for ear marking, as notches of various sizes—according to the age of the pig—can be made simply by pushing the pliers varying distances on the ear. Small pigs up to weaner age should have only a comparatively small piece removed from the ear.

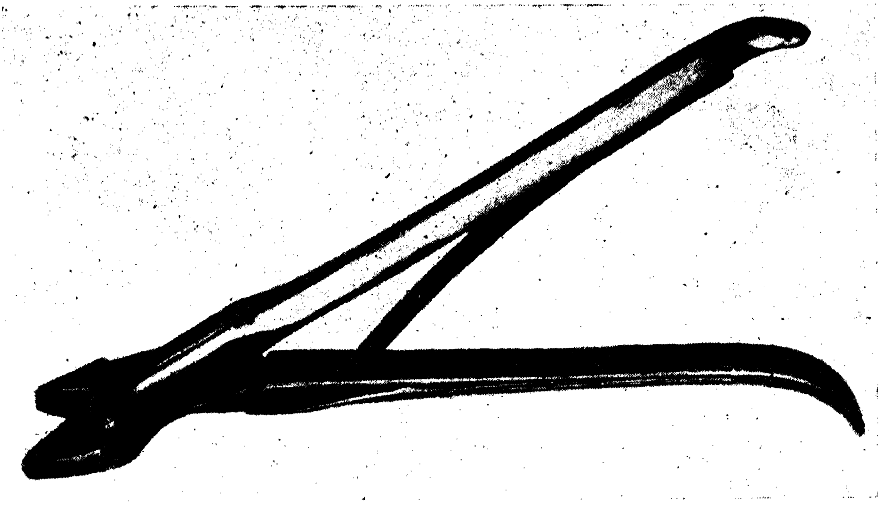


Plate 36.

Ear Marking Pliers with a Λ Shape Cutting Piece.

Careful recording of the ear mark allotted to each animal or each litter of pigs (see specimen, breeding record page 114) is just as important as the marking itself for one's memory should not be relied upon in these matters. Identification of pigs in this way is also of value in recording pedigree and performance.

It should be noted that ear notching is not a desirable method for the identification of pigs intended for slaughter.

ALL-ELECTRIC FARMS.

Electric power operators in England and the National Farmers' Union have formulated a plan to provide every farm in Great Britain with electricity. In the United Kingdom, with its unique nation-wide grid, electricity is available to 97 per cent. of the entire population of the British Isles. The new plan will complete the extension of the distribution systems into the remotest rural areas, and in particular to individual isolated farms. Wartime achievements of agriculture in Britain were made possible largely by the high degree of electrification already attained in the farming industry. In one big farming district in the north of England, for example, 86 per cent. of the farmers are running all-electric farms at low cost, because of the co-operation of the local electricity supply department, which connects up outlying farms without additional charges for long-distance installation. One farm required as much as two and a half miles of overhead cables, but the cost was not passed on to the farmer. This farm has all its fixed machinery, from grain drier to dairy boiler, supplied with light, heat, and power by electricity.

REGISTERED HATCHERIES

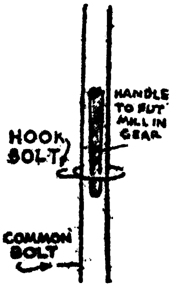
The following applications have been received to the 31st January, 1946, for the registration or the renewal of the registration of hatcheries:—

Name of Owner.	Name of Hatchery.	Breeds of Poultry Kept.
V. H. Allen, Oxley road, Oxley	Alaura	White and Brown Leghorns, Minorcas, Australorps, Langshans, and Rhode Island Reds
I. M. Armstrong, Randall road, Wynnum	Chanticleer	Australorps, Rhode Island Reds, Light Sussex, and Plymouth Rocks
P. R. Bach, Cleveland	..	Australorps and White Leghorns
J. S. Bauer, Oakwood, Bundaberg	Triangle	White Leghorns and Australorps
C. W. Bowtell, 4 Payne street, Toowoomba	..	White Leghorns and Australorps
J. Bowtell, North street, Wilsonton	..	White Leghorns and Australorps
D. L. Burns, Brisbane road, Redcliffe	Yalta	White Leghorns and Australorps
M. H. Campbell, Albany Creek, Aspley	Mahaca	White Leghorns and Australorps
Carr and **Watson,** Logan and Creek roads, Mount Gravatt	Bellview Stud	Australorps, White and Black Leghorns, Rhode Island Reds, and Minorcas
J. L. Carrick and Son, Manly road, Tingalpa	Craigard	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton	White Leghorns
A. R. Chard, Chard's road, Bundaberg	Sunnyland	White Leghorns and Australorps
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
A. J. Daniels, Struck Oil road, Moongan	Struck Oil	White Leghorns, Australorps, and Rhode Island Reds
J. E. Dautel, Rifle Range road, Gympie	..	White Leghorns and Australorps
V. R. Dearling, 85 Holberton street, Toowoomba	..	White Leghorns and Australorps
Dixon Bros., Wondecla	Dixon Bros.	White Leghorns
E. Eckert, Head street, Laidley	Laidley	Australorps, Rhode Island Reds, and White Leghorns
C. L. Eggar, Moggill	Rose Hill	Australorps
Elks and **Sudlow,** Beerwah	Woodlands	Australorps
F. G. Ellis, Stanthorpe road, Warwick	Sunny Corner	Australorps
W. Ellison, junr., Bald Knob, via Landsborough	Willeden	Australorps and White Leghorn,
W. G. Gregory, Deeragun (Box 46, Townsville)	Rocks	White Leghorns and Australorps
T. L. Griffiths, Silkstone, Ipswich	Hillcrest	White Leghorns and Australorps
W. J. Grigg, Tumoulin	..	White Leghorns and Australorps
F. P. Grillmeier, Milman	Mountain View	Minorcas, White Leghorns, and Australorps
P. E. and **G. G. Hannay,** Ridley road, Aspley	Sunny Hill	White Leghorns and Australorps
W. H. Harvey, Trout road, Aspley	Stonehill	White Leghorns
P. Haseman, Stanley terrace, Taringa	Black and White	White Leghorns and Australorps
F. E. Hills, Sim's road, Bundaberg	Littlemore	White and Brown Leghorns, Australorps, Rhode Island Reds, Anconas, and Langshans
H. Hufschmid, Ellison road, Geebung	Meadowbank	White and Brown Leghorns, Rhode Island Reds, Minorcas, and Australorps
A. J. F. Jull, Ramsay street, Middle Ridge, Toowoomba	Stradmore	White Leghorns
R. H. Kennedy, 357 Bridge street, Wilsonton, Toowoomba	..	White Leghorns, Australorps, and Rhode Island Reds
F. E. Kiepe, 40 Hursley road, Toowoomba	..	White Leghorns and Rhode Island Reds
E. C. Kolberg, Handford road, Zillmere	Gerbera	Australorps
W. A. Lehfeldt, Kalapa	Lehfeldts	Australorps
W. A. Luke, 108 Russell street, Toowoomba	Downs	White Leghorns, Rhode Island Reds, and Brown Leghorns
J. McCulloch, White's road, Manly	Hindes	White Leghorns and Australorps
A. Malvine, Waterworks road, The Gap	Alva	Australorps
H. L. Marshall, Kenmore	Stonehenge	Australorps and White Leghorns
A. Mawhinney, Robinson road, Aspley	Aspley	White Leghorns and Australorps
Mrs. P. W. E. Maynard, Doonside, via Dalby	Doonside	Australorps
Mrs. M. J. Meager, Stenner street, Middle Ridge, Toowoomba	Gladfern	White Leghorns and Australorps
C. J. Mengel, New Lindum road, Wynnum West	Mengel's	Australorps
F. J. Miller, 305 Bridge street, Toowoomba	..	White Leghorns
J. A. Miller, Racecourse road, Charters Towers	Hillview	White Leghorns
F. S. Morrison ,Kenmore	Dunglass	Australorps

REGISTERED HATCHERIES—*continued.*

Name of Owner.	Name of Hatchery.	Breeds of Poultry Kept.
H. Obst and Sons, Shepperd	Collegeholme	White Leghorns and Australorps
C. E. E. Olsen, Marmor	Squaredeal	White, Brown, and Black Leghorns, Australorps, Langshans, and Anconas
A. C. Pearce, Marlborough	Marlborough	Australorps, Rhode Island Reds, Langshans, Light Sussex, White Wyandottes, and Khaki Campbell and Indian Runner Ducks
W. J. Perkins, 110 Neil street, Toowoomba	Rhode Island Red Stud	Rhode Island Reds and White Leghorns
G. Pitt, Box 132	Pitt's	White Leghorns, Rhode Island Reds, and Australorps
F. M. Proellocks, 81A Herries street, Toowoomba	Vale View	White Leghorns
J. C. and G. E. Raff, Musgrave road, Sunnybank	Brundholme	Rhode Island Reds, White Leghorns, and Australorps
G. R. Rawson and Son, Main's road, Sunnybank	Sunbeam	Australorps
C. G. A. Rivers, Tamaree	Tamaree	Australorps and White Leghorns
J. Rogoff, Woodridge	Kingston road	White Leghorns and Australorps
C. L. Schlencker, Handford road, Zillmere	Windyridge	White Leghorns and Australorps
J. Schumann, 291 Bridge street, Toowoomba	..	Rhode Island Reds, Brown and White Leghorns
P. H. Scotney, 1 Priest street, Toowoomba	..	White Leghorns and Rhode Island Reds
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa Electric	White Leghorns and Australorps
N. G. Seymour, Ipswich road, Darra	Sohufa	Australorps and White Leghorns
W. B. Slawson, Fraser road, Mitchelton	Kupadibin	Australorps
T. Smith, Isis Junction	Fairview	White Leghorns and Australorps
H. A. Springall, Progress street, Tingalpa	Springfield	White Leghorns
A. W. Stehn and Son, 285 West street, Toowoomba	Red Spot	White and Brown Leghorns, Australorps, and Rhode Island Reds
R. S. L. Stockman, Kairi	Tinaroo	White Leghorns, Australorps, and Rhode Island Reds
A. H. Tebbutt, Stewart terrace, Gympie	Delrae	White Leghorns and Australorps
A. G. Teitzel, West street, Acaciavale, Townsville	Teitzel's	Australorps and White Leghorns
H. G. Thorpe, Box 36, Goomeri	Thorburn	White Leghorns, Rhode Island Reds, and Australorps
W. B. J. Tonkin, Parkhurst, North Rockhampton	Tonkin's	White Leghorns and Australorps
W. Warren, Progress street, Tingalpa	Wilshirlyn	Australorps and White Leghorns
N. J. Watson, Jerry's Downfall, via Kingston	Glencoe	White Leghorns and Australorps
G. A. C. Weaver, Herberton road, Atherton	Weaver's	White Leghorns, Australorps, and Brown Leghorns
F. H. J. Weeks, Bajool	Glen Brae	Black, White, and Brown Leghorns, and Anconas and Australorps
Mrs. V. M. White, Archerfield road, Darra	Viola	White Leghorns and Australorps
Mrs. I. G. Winter, 761 Ruthven street, Toowoomba	..	White Leghorns
Mrs. L. M. Wooller, Huet street, Rockhampton	Riverview	Rhode Island Reds, White Leghorns, and Australorps
P. A. Wright, Laidley	Chillowdeane	Australorps and Brown and White Leghorns

◆



WINDMILL CONTROL.

Most windmill handles have to be tied or wired to keep them in place on a windy day. Here is a device which is much handier. Take a large iron ring, large enough to go around the leg of the windmill. Cut the ring through with a hacksaw so that it can be slipped around the leg of the mill. The ring can be sprung enough to let it slip freely over the hook bolt in the mill leg when the mill is to be put into gear. It is easy to slide the ring up and down, and the handle cannot fly up when the ring is in place.

QUEENSLAND SHOW DATES.

Queensland Agricultural Show Societies are quickly moving again into active organization, and appended is a list of show dates, registered up to 10th January by the Queensland Chamber of Agricultural Societies, for 1946:—

FEBRUARY.

Stanthorpe	7th and 8th
Killarney	22nd and 23rd
Warwick	26th, 27th, and 28th

MARCH.

Goombungee	16th
Pittsworth	19th and 20th
Millmerran	22nd
Oakey	27th and 28th

APRIL.

Toowoomba	2nd to 4th
Dalby	9th and 10th
Chinchilla	11th and 12th
Miles (Show and Bushmen's Carnival)	17th and 18th
Mount Perry	27th
Nanango	26th and 27th
Roma	30th, and 1st and 2nd May

MAY.

Monto	1st and 2nd
Kingaroy	1st, 2nd, and 3rd
Eidsvold	6th and 7th
Murgon	9th, 10th, and 11th
Beaudesert	8th and 9th (Camp Draft 10th and 11th)
Kilkivan	17th and 18th
Esk	17th and 18th
Gympie	22nd and 23rd
Biloela	23rd and 24th
Laidley	24th and 25th
Blackbutt	24th and 25th

JUNE.

Kalbar	**1st**
Maryborough	6th, 7th, and **8th**
Boonah	7th **and 8th**
Childers	10th and **11th**
Bundaberg	13th, 14th, and **15th**
Lowood	14th, 15th, and **17th**
Gin Gin	17th and **18th**
Rockhampton	19th to **22nd**
Gladstone	20th and **21st**
Mackay	24th to **27th**
Toogoolawah	28th and **29th**

JULY.

Proserpine	5th and **6th**
Rosewood	12th and **13th**
Gatton	19th and **20th**
Cairns	23rd, 24th, and **25th**
Yarraman	26th and **27th**
Ipswich	30th **and 31st,** and 1st and 2nd **August**

AUGUST.

Lawnton	2nd and **3rd**
R.N.A.	12th to **17th**

SEPTEMBER.

Canungra	**7th**
Beenleigh	20th and **21st**

OCTOBER.

Nerang	4th and **5th**

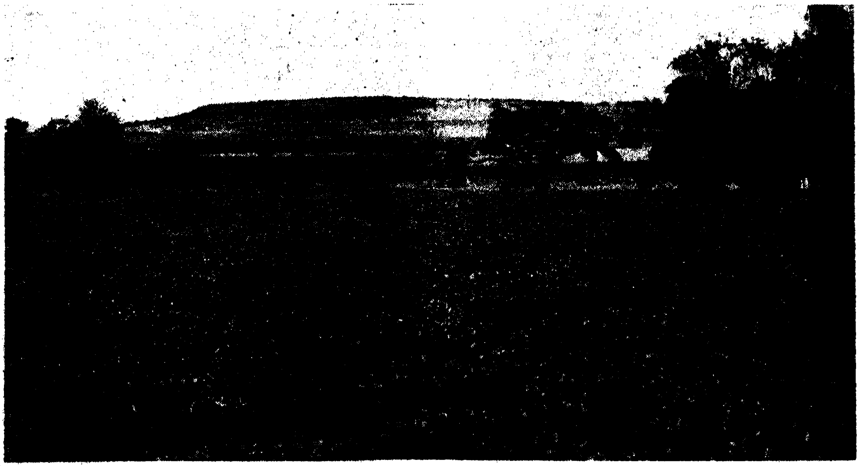


Plate 37.

PEANUT AND MAIZE CROPS, KINGAROY DISTRICT.

GENERAL NOTES

Staff Changes and Appointments.

Mr. A. R. Nott, Government Veterinary Officer, Department of Agriculture and Stock, has been appointed Acting Divisional Veterinary Officer, Department of Agriculture and Stock, Rockhampton.

Mr. R. M. Marshall has been appointed Inspector, Division II., under the Diseases in Stock Acts and the Slaughtering Act, Department of Agriculture and Stock.

Messrs. V. G. Tredwell (Currumbin) and A. W. Want (Yandina) have been appointed Growers' Representatives on the Banana Industry Protection Board until the 30th September, 1946.

Mr. E. Sutherland, Temporary Adviser on Dairy Machinery, Department of Agriculture and Stock, has been appointed Dairy Adviser (Machinery) in the Department.

Mr. E. U. McCarthy, Q.D.A. Assistant to Plant Breeder, Queensland Agricultural High School and College, Gatton, has been appointed Adviser, Agriculture Branch, Department of Agriculture and Stock.

Mr. E. L. Melville, Q.D.D. (Sunnybank), has been appointed Adviser, Pig Branch, Department of Agriculture and Stock.

Following an extension of the activities of the Pig Branch, the undermentioned officers of this section of the Department of Agriculture and Stock have been assigned to headquarters as follows:—Mr. B. R. Martin, B.Sc., Adviser, returned from war service, will be stationed at Toowoomba; Mr. E. R. Melville, Q.D.D., recently appointed an Adviser, will be attached to Brisbane; and Mr. C. R. Grieve, Assistant Adviser, will take up duty at Murgon in the near future.

End of Poultry Mash and Crude Protein Rationing.

The Minister for Agriculture and Stock (Hon. T. L. Williams) has announced that the rationing of commercially prepared poultry mashes and crude protein meals of animal origin has been lifted as from the last day of January.

The feeding position has been reviewed at frequent intervals. The review made in December last disclosed the fact that many coupons issued to poultry keepers had not been surrendered, and from a more recent survey of the position it was found that coupons for approximately 1,500 tons of poultry mash will not be used during the current period.

The present rationing plan was based on egg production. It is considered that the improvement in egg supplies is such that poultry raisers who wish to engage in the production of table poultry should be given the opportunity to do so rather than continue the overproduction of eggs.

With reference to a recent Press statement relative to rationing in Toowoomba, it is interesting to note that poultry farmers in the Darling Downs area have been supplied with coupons to the value of 1,418 tons of poultry mash, whereas ingredients have been allotted to manufacturers of this product on the Downs for use in that area sufficient for an output of 427 tons, the difference being made up, as in normal times, by supplies drawn from other parts of the State. The quantities of ingredients allocated for the manufacture of poultry mashes were based on stated sales prior to the introduction of the rationing scheme.

The elimination of rationing of crude protein of animal origin is possible as the result of increased production of these meals. The production is now sufficient to meet normal requirements in Queensland.

The rationing of bran and pollard is being continued after the 31st January, 1946, and permits will be posted as usual to dairy farmers supplying milk for human consumption and to poultry keepers who are accustomed to preparing their own mashes, providing that these persons have previously received permits for these mill offals.

Expansion of the Wool Branch.

The Minister for Agriculture and Stock (Hon. T. L. Williams) has announced that, in furtherance of the policy of his Department in respect of the expansion of the Sheep and Wool Branch the Governor in Council had approved of the following appointments:—

Mr. G. R. Morrison to be Senior Adviser, on probation; Mr. H. C. Hall to be Adviser; Mr. J. H. Campbell to be Adviser, on probation; and Mr. G. S. McGregor to be Cadet, on probation.

Mr. C. J. Swinburne, Adviser in Sheep and Wool at Blackall, has now been promoted to the position of Senior Adviser.

It is proposed to assign some of these officers for field duties to the pastoral areas of the State.

Following the recent appointment of Mr. F. Bryant as Assistant Wool Technologist, it is proposed to set up a fleece testing unit in the Department as part of a programme of research in the wool industry, and arrangements are now in progress to obtain the necessary equipment.

Extension of Veterinary Services.

With the gradual return to normal conditions, it is now proposed to extend the activities of the Veterinary Section of the Division of Animal Industry within the Department of Agriculture and Stock.

Difficulty has been experienced in obtaining suitable veterinary officers, because of claims made on their services by other Departments and by the Commonwealth, also because of their absence on military duties. The Minister for Agriculture and Stock (Hon. T. L. Williams) has announced that arrangements have been made for the following additional appointments:—

Mr. W. H. Southcott, B.V.Sc., to be Veterinary Officer, on probation.

Mr. A. T. Bell, B.V.Sc., to be Assistant Veterinary Officer, on probation.

Mr. P. J. O'Sullivan, Q.D.A., B.Agr.Sc., to be Assistant Parasitologist, on probation.

These officers will be stationed at the Animal Health Station, Yeerongpilly.

Vegetable Group Committee.

Following on the amendment of the *Fruit Marketing Organisation Acts* passed last session, providing for the setting up of a vegetable sectional group committee within the Committee of Direction of Fruit Marketing, the Minister for Agriculture and Stock (Hon. T. L. Williams) has announced the undermentioned appointments, provisionally, as members of the Vegetable Group Committee:—

Messrs.—
E. H. Short (Dimbulah), representing Far North Queensland;
H. A. H. Scott (Bowen)—Lower North Queensland;
T. P. Reynolds (Chatsworth, via Gympie)—Gympie and District;
W. J. Beattie (Lagoon Pocket, via Gympie)—Mary Valley;
R. J. McAnally (Cooroy)—Near North Coast;
C. H. Woff (Sunnybank)—Brisbane Metropolitan Area;
C. M. Apps (Wellington Point)—Northern Section, Redlands;
A. E. Newman (Gracemere)—Central Queensland;
R. H. Blake (Cleveland)—Southern Section, Redlands;
J. C. H. Logan (Upper Tent Hill)—Gatton and District.

These members will hold office until vegetable growers have an opportunity of electing members to a vegetable group committee when the Committee of Direction elections are held in August next, after which the present appointed members will go out of office unless they, or any of them, are re-elected.

Sugar Values.

The total value of the 1944 sugar output is computed by the Sugar Board to be £12,740,000, the average price for all sugar being £19 16s. 1d. on the 94 net titre basis. The quantity sold in No. 2 Pool (that is, sugar produced by mills in excess of their "peaks" but produced from cane grown on assigned land) was 13,300 tons, while 22 tons of "excess" sugar was manufactured from cane grown on non-assigned land. The average price of No. 1 Pool sugar was £19 18s. 1d., and of sugar surplus to Australia's domestic requirements, £15 0s. 6d. per ton.—*From Ann. Rept. Bur. Sug. Expt. Stns.*

Rural Topics

Junior Farmers Come to Town.

A visit from junior farmers, 60 strong, from the Northern Rivers of New South Wales, was a recent welcome event. Their educational tour extended from the Border to Warwick, thence over the Darling Downs to Toowoomba and down through the Lockyer, calling at Gatton Agricultural College and the woollen mills and railway workshops at Ipswich on the way. In Brisbane, the boys were shown over the laboratories of the Department of Agriculture and Stock, where they saw the war against wogs being waged in earnest. Frank in giving their impressions, they spoke of Queensland as the coming State from a farming point of view. These young farmers were out to see for themselves what the other fellow does and why he does it. To them the week was crammed full of interest, and they went back home, as one young farmer put it, ''with wider vision and greater faith in farming and its future in Australia.''

Members of the Junior Farmers' Clubs of New South Wales, their visit was sponsored by the North Coast District Council of that body, with headquarters at Lismore. As one important result of their visit an extension of the Junior Farmers' Movement to this State may be anticipated.

History of the Junior Farmers' Movement.—The history of their movement as told by one of its bright young leaders has an interest for the country men and women of Queensland. It was established in 1928, chiefly to check the drift of young people from the land to the towns and cities. Its members, both boys and girls between the ages of 10 and 21, were provided with definite objectives to induce them to cultivate an interest in their own rural environment. ''Out of small beginnings come great ends.'' Junior Farmers' Clubs were formed throughout the Northern Rivers. This year's aggregate membership in that district alone is over 500. Throughout New South Wales there are now 360 clubs with a membership aggregating 12,000. The confidence and support of parents and district farmers were quickly gained. Agricultural and other teachers, numbering over 100, act as part-time supervisors, but mainly the boys themselves supply their own leadership. The educational and social value of these Junior Farmers' Clubs is appreciated in every country centre where they exist, and especially the practical and technical nature of the projects undertaken by them, for which expert guidance is obtained from the trained field men of the Department of Agriculture. State records in potato yields, maize yields and vegetable production have been set up by these young farmers, and many of them have repeatedly won the highest awards in animal husbandry and farm produce classes at district shows. In all cases these junior farmers have developed skill and efficiency in farming technique and have acquired a broader interest in country life and industry.

Between the Home and the School.—Between the school and the home close contact is maintained. This is more effective than it appears at first sight. Parents realize that their boys and girls are being treated as individuals, with individual tastes and inclinations; and there's a carry-over from the school to the home which stimulates interest and confidence in both parent and youngster. Development of co-operation, community training, good citizenship and personal character are diligently fostered.

Influence on Social Life and Rural Progress.—Field days on district farms are arranged, and every district show has full entries from club members. Pot-hunting is not encouraged, and in many cases cups and other trophies have been replaced by ribands and honour cards. Club interests are not entirely agricultural, for members also take an active part in the social life of the whole community. Debates, films, dances, excursions, camps and organized games are all included in regular club activities. Character training is largely developed by the need for perseverance and hard work in carrying out club projects. Capacity for real work and pride in the job is inculcated on the principle that high wages and improved standards of living will be ineffective, unless accompaned by a desire to put maximum effort and pride in the task undertaken. Greater and improved agricultural production and better living conditions on the farm and in country centres are claimed as club achievements. Among other achievements of these Junior Farmers' Clubs are higher crop yields by its members over district averages; improved methods and ideas in local agricultural practice; improvement in country show exhibits; development of closer personal and social contacts between the junior farmers themselves and their seniors at field days, shows and committee and council meetings; and a steady increase of enrolments at Agricultural High Schools and at the Technical Colleges and at the Hawkesbury Agricultural College—in short, a decided stimulus in the development of advanced agricultural education and a more complete country life. The voluntary services of district farmers are enlisted by club members in carrying out their farm projects.

Agricultural Education.—These Junior Farmers' Clubs initiated a vigorous drive for more secondary agricultural education for rural communities, and so provide opportunities for farm boys to become expert farmers and leaders of their own industry with a sound technical background. The clubs are helped by local advisory committees of farmers and townspeople, who give voluntary and ungrudging service to the club movement.

Future of the Movement.—As to the future of the Junior Farmers' Clubs, one young member, speaking with every confidence, put it this way: ''The future responsibilities and opportunities of the Junior Farmers' Clubs for usefulness are immense, and they will be rather an important factor, in my opinion, in developing our future agricultural production, which is as necessary as industrial development. And there is no reason why agriculture shouldn't be on the same footing economically as other industries, for farmers, including junior farmers, are entitled to fair prices for the things they grow and to living standards and amenities comparable with those of their fellow-citizens engaged in other industries.''

Our School Project Clubs in Queensland are, in common with our Rural Schools, working largely along similar lines and will, no doubt, expand into Junior Farmers' Clubs, as in the South, which, in turn, are modelled in some measure on the 4-H Club Movement which has done so much to advance agriculture in America.

The Bid for Better Butter.

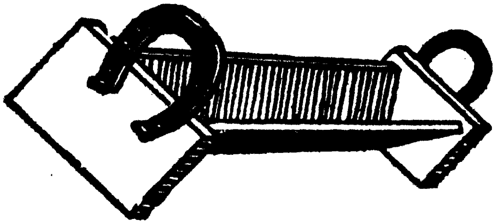
Now, more than ever before, we are hearing a lot about the challenge of margarine to butter—a challenge made more real by wartime rationing. From all accounts, the consumption of margarine has increased enormously in Britain, our best butter export market. Two ounces of butter a week is all that's allowed each person in Britain under the rationing scheme, so naturally there's a growing demand for butter substitutes and margarine fills the bill as the favourite choice. The trouble is that from the dairy farmers' point of view margarine, a tasty substitute, has already got a long lead over butter, and the question arises will that lead be easy to overtake when the need for butter rationing ends? It's no good denying the palatability and food value of margarine as it is now made, nor the seriousness of the competition between it and butter on the British breakfast table.

What we have to do, therefore, is to maintain the highest attainable quality in our export butter, for quality, as well as price, will be a determining factor in the regaining and the retaining of our butter markets overseas. It's still easy to sell all the butter we can send, and will be for some years yet, but now is the time to look further ahead and so arrange our export trade on the basis of highest quality standards. We have to remember that tastes now formed will take a lot of changing, and it's no good under-estimating the strength of the challenge of margarine. Better butter will, it is believed, be the winning bid on the export market.

Rules for Riding.

Keep up your head and your heart, your hands and your heels keep down.
Press your knees close to your horse's sides, and your elbows close to your own.

GADGETS AND WRINKLES

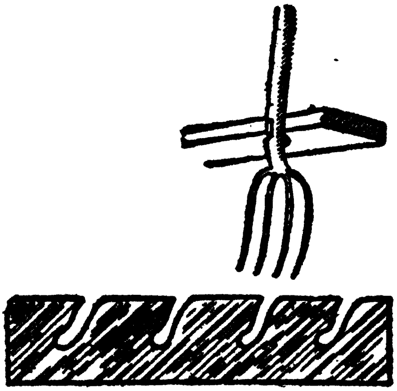


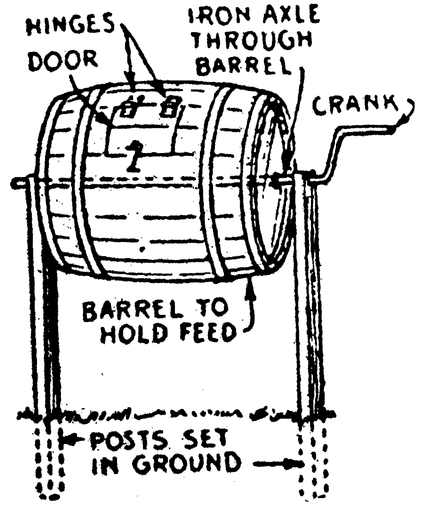
HANDLES FOR A PIG TROUGH.

A horseshoe nailed at each end of a pig trough will make it easier to move about the feeding floor when cleaning up.

HANG FORKS UP.

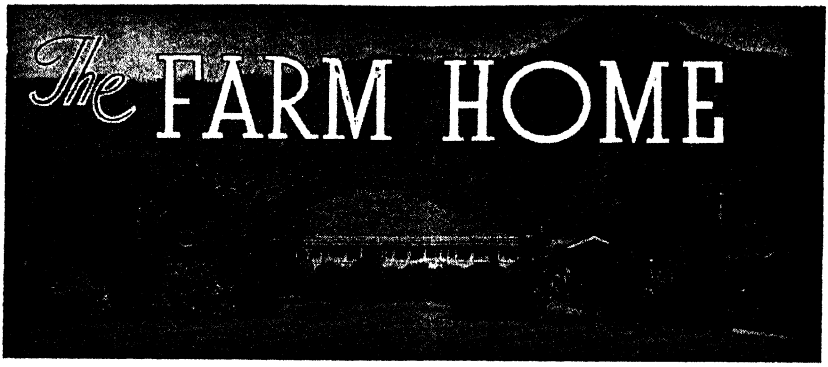
Instead of standing forks in a corner, it is handier (with less risk of accident by falling with sharp points upward) to make a hanger for them. The hanger is cut from an old board, with holes bored in it to fit the handles, then a notch sawn into each hole (see drawing) to pass the handle through. The tools are hung with the fork end up, and they stay up where they can do no damage. Other tools may be hung the same way.





DRY FEED MIXER.

Dry feeds can be mixed quickly and easily with this outfit. An ordinary wooden barrel is mounted between two posts on an iron rod which is bent at one end to form a crank. A door is cut in the side of the barrel and fitted with hinges and a hook to hold it tightly shut.



Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

THE PROBLEM OF THE ONLY CHILD.

THERE is a traditional belief that the only child will not turn out well. This, of course, is not true, for only children often turn out very well. There is no doubt, however, that an only child is handicapped. The child brought up in a family of several children is to a large extent disciplined by them, apart from any discipline or guidance he may receive from his parents.

In the bringing up of all children, it is most important that parents should agree in regard to their management, and that one should support the other. This applies particularly to the management of the only child.

There is always the danger that, having only the one child on whom to lavish their attention and affection, parents may pamper and spoil him. In their anxiety to make him a model child, they may fuss over him and nag at him, until, feeling deprived of his freedom and experiencing a sense of frustration, he comes unhappy, irritable and resentful, loses confidence in himself, or, in the case of a strong-willed child, becomes defiant. It is better to encourage a child to develop a degree of independence than to insist on his conforming to standards of behaviour which may be beyond his capacity to reach at the moment.

To ensure healthy development, an only child should be allowed from an early age to mix with other childrenn. If this can be done in conjunction with his attendance at a nursery school or kindergarten under trained supervision, so much the better. What applies to the boy applies equally to the girl.

While realizing their responsibility in regard to the child's training and development, parents should keep in mind that example is better than precept and that healthy development is most likely to occur where there exists in the home an atmosphere of harmony, true companionship, and goodwill.

The only child is not infrequently an adopted child, and in this case the problem of management may be made easier by the periodical adoption of another infant, until the family is gradually built up.

Any further advice in regard to this or any other matter concerning child management can be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau,* 184 *St. Paul's Terrace, Brisbane,* or by addressing letters, "*Baby Clinic, Brisbane.*" These letters need not be stamped.

IN THE FARM KITCHEN.

Useful Hints.

When butter is short a substitute can be made by rendering chicken fat and a little suet together and allowing to set. Chicken fat is excellent for frying fish; it does not melt like other fats.

When creaming butter and sugar together add about one tablespoonful of hot milk. This helps to melt the sugar.

Egg and Onion Pie.

Line a tart plate with a good short crust. Fry 4 oz. of bacon, previously cut into strips. Add three or four sliced onions and cook until soft, but not dry. Add pepper and salt to tastes, and a dessertspoon of chopped parsley. Beat three eggs and add half a cup of milk or stock, and, if liked, a little mixed mustard. Fill the prepared tart case and bake in a moderate oven until a golden brown and quite set.

Potato Fritters.

Grate 2 cups of peeled raw potato and drop into cold water. Drain well and add to a batter made with 1 beaten egg, ½ cup of milk, 1 teaspoon of melted dripping, and 2 tablespoons of plain flour, pepper and salt, and 1 teaspoon of chopped parsley. Drop in spoonsful on well-greased pan and cook slowly until well browned, then turn and cook on the other side. Serve with bacon for a light luncheon.

Vegetable Pie.

Mix together ½ cup of cooked and diced potato, carrots, beans, and celery, ½ cup of cooked peas, 1 tablespoon of grated raw onion, 1 cup of soft breadcrumbs, 1½ cups of milk or stock, pepper and salt to taste, and 2 beaten eggs. Bake for half an hour. The top may be covered with buttered crumbs or strips of pastry, lattice fashion. This pie is excellent with cold meat.

Oatmeal Griddle Cakes.

One cup of cooked oatmeal, 1 cup of flour, 1½ cups of milk, 1 egg, 1 teaspoon of salt, 1 tablespoon of melted butter, 2 teaspoons of baking powder. Add the milk, salt, yolk of egg and fat to the oatmeal and beat for three minutes, then add the flour and baking powder, also the white of egg, stiffly frothed. The batter should be like thick cream. Drop in spoonfuls on a hot griddle well greased, and cook till brown on one side, then turn and cook the other side. Serve with syrup.

Coffee Crisps.

Mix 2 cups of self-raising flour with 1 cup of fine oatmeal and 1 cup of sugar. Melt 1 cup of fresh, well-clarified dripping in a saucepan with 1 cup of milk (or milk and water). Add a good pinch of baking soda to the warm mixture, and flavour with a dessertspoon of coffee essence. While still nicely warm pour over the flour and oatmeal. Mix quickly to a smooth dough. Knead a very little on a floured board. Roll out very thin. Cut with a sharp knife or fancy cutter. Bake in moderate oven till a pretty brown.

Marie Biscuits.

Cream together ½ lb. sugar and ¼ lb. butter, add 2 well-beaten eggs and blend thoroughly. Sift together 2 tablespoons of cornflour, 1 teaspoon of baking powder and a pinch of salt and add to the above mixture. Work in slowly ½ a cup of milk in which ½ a teaspoon of bicarbonate of soda has been dissolved. When all are well blended add enough sifted flour to make a firm, easy-to-handle dough. Roll out thinly, cut into rounds, prick and bake in a moderate oven to a light fawn colour.

Date Patty Cakes.

Mix one-third cup soft butter with 1 and one-third cup brown sugar. When partly creamed, break in 2 eggs and beat mixture until very light. Then add ½ cup milk, 1¾ cups sifted flour, mixed with 2 teaspoons baking powder. Beat to a smooth batter, then stir in ½ teaspoon each of cinnamon and nutmeg, and ½ lb. of chopped dates rolled in flour. Beat hard for two or three minutes. Bake in fancy papers and ice.

ASTRONOMICAL DATA FOR QUEENSLAND.

MARCH.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	5.41	6.20	Cairns	30	27	Longreach	36	34
6	5.44	6.15	Charleville	27	27	Quilpie	35	35
11	5.46	6.10	Cloncurry	51	48	Rockhampton ..	10	10
16	5·49	6.04	Cunnamulla ..	29	29	Roma	17	17
21	5.51	5.59	Dirranbandi ..	19	19	Townsville.. ..	25	23
26	5.54	5.53	Emerald	19	19	Winton	41	39
31	5.57	5.48	Hughenden ..	35	33	Warwick	4	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	a.m.	p.m.
1	2 43	4·49
2	3.43	5·34
3	4.45	6.15
4	5.49	6.54
5	6·52	7.32
6	7.56	8.09
7	9.00	9.48
8	10.05	10.29
9	11.11	11.14
	p.m	
10	12.17	11.04
11	1.20	11·58
12	2.21	..
		a.m.
13	3.16	12.56
14	4.05	1.57
15	4.49	2.58
16	5·28	3.58
17	6.02	4.57
18	6.35	5.53
19	7.06	6.47
20	7·37	7.41
21	8.09	8.34
22	8.43	9.27
23	9.20	10.20
24	10.00	11.14
		p.m.
25	10.45	12.08
26	11.34	1.01
27	..	1·52
	a.m.	
28	12.28	2.40
29	1.26	3.25
30	2.27	4.07
31	3·30	4·47

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17 Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	28	12	44	27	19	2	52	30
6	19	20	35	37	10	11	39	42
11	11	29	26	44	0	19	28	52
16	14	25	30	41	5	16	34	48
21	24	15	40	31	15	6	46	35
26	29	11	44	25	19	0	52	28
31	24	13	41	29	16	3	47	32

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	51	8	65	36	49	22	42	9
3	44	16	60	42	45	27	36	16
5	33	27	53	48	38	33	28	23
7	22	38	46	56	30	41	20	33
9	12	47	39	62	24	47	12	39
11	6	51	36	64	20	50	7	43
13	7	51	36	64	21	50	8	43
15	13	47	39	62	24	47	13	93
17	21	39	45	57	30	42	19	33
19	30	29	51	50	35	85	25	25
21	40	19	57	44	42	29	33	18
23	48	11	63	38	47	24	39	12
25	52	6	66	35	50	21	43	8
27	52	5	66	34	50	20	43	7
29	50	6	64	35	48	21	41	8
31	42	13	58	40	43	25	35	14

PHASES OF THE MOON.

New Moon, March 4th, 4.01 a.m.; First Quarter, March 10th, 10.03 p.m.; Full Moon, March 18th, 5.11 a.m.; Last Quarter, March 26th, 8.37 a.m.

The equinox of March 1946 (the autumnal equinox of the Southern Hemisphere) occurs at 4 p.m. Eastern Australian standard time on the 21st. The Sun will then shine directly over the equator and on that day will rise and set at true east and true west, respectively. The term equinox signifies equal night and implies the equal duration of night and day. However, although the Sun's centre is above the horizon for half the 24 hours, from the table of sunrise and sunset it will be noticed that on the 21st the interval from sunrise to sunset is 12 hours 8 minutes. This arises from the fact that we see the edge of the Sun about 4 minutes before the centre is on the theoretical horizon and about 4 minutes after the centre sinks below the horizon in the evening.

On March the 6th and 18th, the Moon will rise and set almost true east and true west, respectively. It will be observed that for the few days near this full moon there is only a little more than 30 minutes later in the times of moonrise each succeeding day. This is the corresponding "harvest moon" to that which occurs in the northern hemisphere in September and which is of so much value in harvest operations. In Queensland, the effect is not as marked as in the higher latitudes and harvesting is well over by March.

Mercury.—At the beginning of the month Mercury will set about 40 minutes after sunset and at the end of the month it will rise about 35 minutes before sunrise.

Venus.—At the beginning of the month, in the constellation of Aquarius, this planet will set about 25 minutes after sunset. At the end of the month, in the constellation of Pisces it will set about 45 minutes afer sunset.

Mars.—At the beginning of the month, setting soon after midnight, this planet to the west of Castor and Pollux will have commenced its journey eastward again in relation to the fixed stars; and by the end of the month will be between Pollux and Saturn, setting about midnight. On March 12th at 9 p.m. it will be 1 degree north of the Moon.

Jupiter.—Near Spica, Jupiter, at the beginning of the month will rise between 8.30 p.m. and 9.30 p.m. and will be visible low in the eastern evening sky. At the end of the month it will rise about an hour after sunset.

Saturn.—Still making interesting patterns with Mars and Castor and Pollux, Saturn at the beginning of March will set between 1.45 a.m. and 3.10 a.m. about 25 degrees north of true west. At the end of the month it will set about midnight. On the 19th it will be 3 degrees south of Mars, and on the 12th 2 degrees south of the Moon.

◆

QUEENSLAND WEATHER FOR JANUARY.

January rains, particularly during the second and third weeks, gave practically a State-wide distribution of valuable to heavy over-average totals. Slightly under normal amounts were received in scattered localities in the Carpentaria and North Coast Barron and somewhat more generally in the South Coast, Port Curtis, and northern Moreton districts. In the Port Curtis coastal section deficiencies in the last four months have been a somewhat unusual feature. Early seasonal rains over drier inland pastoral areas were opportune, particularly in the Central-West and South-West. Present relief in those districts will need to be consolidated by further soaking falls in February and March to offset the past series of adverse seasons. Some heavy daily rain registrations included Einasleigh 405 points (8th) and many 2 to 3-inch totals east Carpentaria (9/10th), Central Coast amounts 726 points Giru. 939 Proserpine (10th), Mackay 1,037, Bloomsbury 990, Eton 769 (11th), Ayrshire Downs 8 inches (12th), and Torrens Creek 556 points, Woodstock 360, and Prairie 340 (22nd). On the 23rd a number of stations west and south of Brisbane reported 3 to 5 inches up to 624 at Kalbar and 630 at Laidley. These falls caused local flooding, Lockyer Creek, &c., but main streams in the Moreton and Port Curtis districts were not affected. However, much flooding of low-lying areas occurred in practically every other river basin in the State with consequent transport difficulties and train service dislocations on far north and inland lines. Central and Tropical Coast streams from adjacent highland catchment areas and Carpentaria systems, especially the Flinders, were affected by the heavy falls in the eastern headwaters. In the Central and South-West areas river beds carried valuable run-off miles wide from the heavy Upper West and Central Interior falls. In the third week Downs and Maranoa catchments and river basins received heavy to local flood rains. Highest river heights recorded—Flinders, Richmond, 33 ft. (24th); Hughenden 9 ft. (22nd); Barcoo, Isisford, 15 ft. 6 in. (23rd); Paroo, Eulo, 9 ft. 1 in. (23rd/24th); Warrego, Charleville, 10 ft. 10 in. (22nd); Wyandra 10 ft. 6 in. (25th); Cunnamulla 15 ft. 3 in. (28th); Fitzroy system—Dawson River, Taroom, 19 ft. 9 in. (25th); Baralaba 18 ft. 8 in. (31st); Boolburra 16 ft. 3 in. (1st February); Mackenzie River, Comet, 34 ft. 10 in. (24th); Fitzroy River, Riverslea, 24 ft. 8 in. (28th); Yaamba 19 ft. 6 in. (29th); Funnel Creek, Saltbush Park, 16 ft. 6 in. (15th); Isaacs River, Clive Station, 30 ft. (24th); Brisbane River system—Lockyer Creek, Gatton, 27 ft. 6 in. (23rd); Warril Creek, Harrisville, 15 ft. 9 in. (25th); Bremer, Rosewood, 18 ft. 6 in. (23rd); Burdekin River system—Burdekin, Gibson's Farm (Home Hill), 25 ft. 8 in. (24th); at Bridge 2 ft. 9 in. over rails; Sellheim 22 ft. (22nd); Suttor River, Lornsleigh, 15 ft. 8 in. (25th); Condamine system—Dogwood Creek, Miles, 28 ft. (24th); Condamine River, Tummavil, 29 ft. 3 in. (24th); Warwick 15 ft. 6 in. (24th); Kings Creek, Clifton, 19 ft. (23rd); Condamine, Condamine, 22 ft. 6 in. (2nd February); Pratten 19 ft. 9 in. (25th); Surat and St. George still rising at end of month; MacIntyre and Severn system—MacIntyre River, Inglewood, 9 ft. (25th); Goondiwindi 24 ft. 7 in. (27th); Dumaresque, Riverton, 18 ft. 4 in. (23rd); Texas 21 ft.

Temperatures.—Average maximum temperatures ranged from 2.6 degrees below normal at Boulia (98.3 degrees) to 2.0 degrees above at Palmerville (91.3 degrees). Average minimum readings from 2.2 degrees below at Palmerville (71.3 degrees) to 3.2 degrees above at Georgetown and Longreach and 5.9 degrees at Mitchell. The highest daily reading was 113 degrees on 3rd at Boulia. Days over 100 degrees—Richmond 26 (13 consecutive), Winton 25, Camooweal 23 and Windorah 20.

The rain position is summarised below—

District.	Normal Mean.	Mean Jan., 1946.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	1,389	1,603	15 above
Peninsula South	935	1,512	62 ,,
Lower Carpentaria	725	878	21 ,,
Upper Carpentaria	628	1,495	138 ,,
North Coast, Barron	1,328	1,208	9 below
North Coast, Herbert	1,411	2,230	58 above
Central Coast, East	893	1,261	41 ,,
Central Coast, West	537	881	64 ,,
Central Highlands	400	585	46 ,,
Central Lowlands	321	563	75 ,,
Upper Western	316	656	108 ,,
Lower Western	170	308	81 ,,
South Coast, Port Curtis	658	600	9 below
South Coast, Moreton	671	654	3 ,,
Darling Downs East	375	674	80 above
Darling Downs West	298	571	91 ,,
Maranoa	302	424	40 ,,
Warrego	214	407	90 ,,
Far South-West	191	231	21 ,,

Commonwealth of Australia, Meteorological Bureau, Brisbane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

JANUARY RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of years' re-ccrds.	Jan., 1945.	Jan., 1946.		Jan.	No. of years' re-cords.	Jan., 1945.	Jan., 1946.
North Coast.	In.		In.	In.	*South Coast—cont'd.*	In.		In.	In.
Atherton	11·52	42	15·22	19·38	Gatton College	4·32	44	3·62	9·27
Cairns	16·43	61	23·22	12·81	Gayndah	4·70	72	5·34	7·10
Cardwell	16·99	71	13·29	25·54	Gympie	6·57	73	6·31	5·08
Cooktown	14·10	67	19·66	9·93	Kilkivan	5·63	62	5·34	9·28
Herberton	9·31	57	11·74	13·49	Maryborough	6·97	72	7·97	5·70
Ingham	15·96	51	8·97	26·59	Nambour	9·37	47	4·74	9·30
Innisfail	20·24	62	26·14	30·04	Nanango	4·65	61	4·29	5·19
Mossman	18·87	19	22·41	19·40	Rockhampton	7·39	72	2·33	9·71
Townsville	11·05	72	3·03	15·60	Woodford	7·72	55	5·75	6·58
Central Coast.					*Darling Downs.*				
Ayr	10·95	56	4·12	14·09	Dalby	3·44	73	3·84	5·24
Bowen	9·65	72	4·02	17·65	Emu Vale	3·22	47	3·72	7·35
Charters Towers	5·35	61	2·88	10·10	Jimbour	3·51	64	2·45	6·91
Mackay	13·50	72	3·38	15·60	Miles	3·83	58	2·04	8·44
Proserpine	14·95	40	5·98	29·12	Stanthorpe	3·68	70	2·23	6·93
St. Lawrence	8·93	72	3·24	13·13	Toowoomba	5·16	71	6·16	9·11
					Warwick	3·58	78	5·03	8·07
South Coast.									
Biggenden	5·25	44	3·63	7·69	*Maranoa.*				
Bundaberg	8·52	60	4·91	4·91	Roma	3·20	69	2·19	2·21
Brisbane Bureau	6·30	94	2·63	4·68	St. George	2·64	62	2·10	4·62
Caboolture	7·96	67	4·74	5·72					
Childers	7·23	48	3·38	8·43	*Central Highlands.*				
Crohamhurst	11·78	50	3·73	7·21	Clermont	5·02	72	3·55	4·32
Esk	5·64	56	3·56	3·45	Springsure	4·21	74	1·55	6·33

CLIMATOLOGICAL TABLE FOR JANUARY.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Coastal.									
Cairns	..	89	74	93	25, 26	67	2	1281	20
Herberton	..	83	65	89	6, 7	58	2	1349	17
Townsville	..	87	76	92	6, 24	71	14	1560	19
Rockhampton	29·86	86	71	99	5, 6	64	9	971	14
Brisbane	29·93	85	70	103	26	63	10	468	12
Darling Downs.									
Dalby	..	90	67	104	5	59	11	524	9
Stanthorpe	..	83	61	97	5	54	1	693	9
Toowoomba	..	82	64	98	5	57	10	911	9
Mid-Interior.									
Georgetown	29·77	93	76	105	2	70	7, 8	1473	16
Longreach	29·82	96	76	108	4	65	11	618	15
Mitchell	29·85	93	72	103	4	55	8	335	6
Western.									
Burketown	..	91	77	99	21	68	9	1031	15
Boulia	29·73	98	76	113	3	68	12	336	11
Thargomindah	29·77	99	76	112	3	62	18	89	3

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

Volume 62 Part 3

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

MARCH, 1946

Issued by Direction of
THE HONOURABLE T. L. WILLIAMS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

PAGE.

Event and Comment—

The Call for Increased Production 131
Expansion of Citriculture 131
Soy Bean Production 132
Tobacco-growing 132
Farm Mechanization 132

Field Crops—

Flue-curing Tobacco 133
Queensland Show Dates 136

Plant Protection—

Pests of Cucurbit Crops 137

The Dairy Industry—

Water and Salt Control in Butter-making 151
Washing Dairy Utensils 156
Production Recording 158

The Pig Farm—

Identification of Pigs 160

The Poultry Farm—

Incubator—Importance of Nutrition 174

Agricultural Chemistry—

Feeding Oat Grain 181

PAGE.

General Notes—

Staff Changes and Appointments .. 183
Oats as Pig Food 183
Wheat Stabilization 183

Rural Topics—

Bureau of Sugar Experiment Stations 184
The Future of Our Export Market—What the British Farmer is Thinking 184
Rural Broadcasts 185

Gadgets and Wrinkles—

Record Cover 186
To Keep Sack Open 186
Egg Candler 186

The Farm Home—

Baby's Skin in Hot Weather 187
In the Farm Kitchen 188
Queensland Weather for February .. 189
Astronomical Data for April 190
Rainfall in the Agricultural Districts 192
Climatological Table for February .. 192

S. P. A.
(SAVE POUNDS ALWAYS)

IMPORTED SEED OATS

The heaviest, cleanest, and best oats only purchased for seed by us and then these are RECLEANED, REGRADED and CLIPPED.

NO WASTE—NO WEEDS

ALGERIANS, FULGHUMS, SUNRISE, BELAHS, MULGAS

PRICES ARE REASONABLE

BEST TRIPLE DRESSED

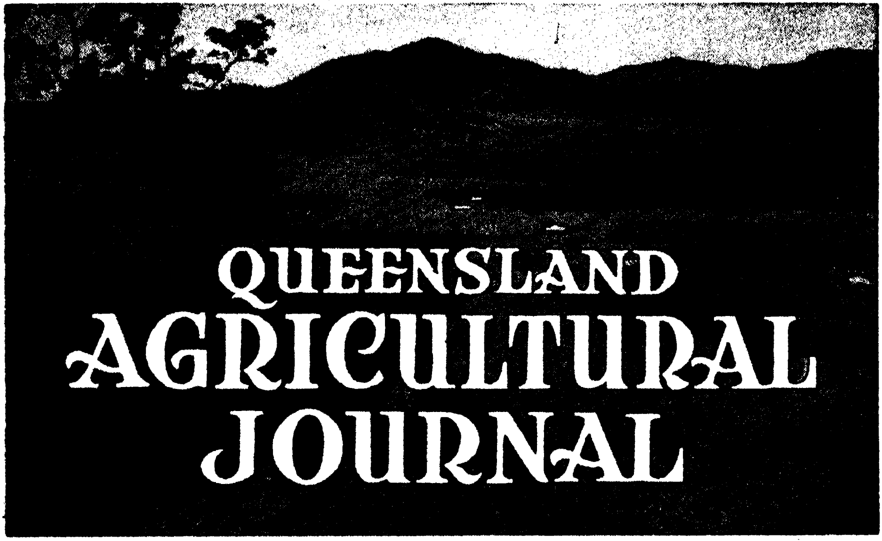
LUCERNE SEED, 2/6 lb.

STATE PRODUCE AGENCY Pty. Ltd.

Agricultural Seedsmen, Farm Produce Agents,

266-274 ROMA STREET, BRISBANE.

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Volume 62 1 MARCH, 1946 Part 3

Event and Comment.

The Call for Increased Production.

MATTERS of great importance to Queensland, as well as to the Commonwealth, in relation to production objectives were discussed at the February meeting of the Australian Agricultural Council in Sydney. Referring to the proceedings on his return to Brisbane, the Minister for Agriculture and Stock (Hon. T. L. Williams) said that much of the discussion had centred on the food position in Britain and on the ways and means by which both the Commonwealth and States could further assist in its amelioration. Not only had he urged a more intensive drive for increased production of wheat, meat, butter and cheese for export to Britain, but had expressed the opinion that with their wider range of nutritious substitutes Australians might be asked to do with less of those commodities so that the food requirements of the needy nations might be more fully supplied.

Expansion of Citriculture.

On the question of the proposed extension of the area under citrus fruits in Australia, Mr. Williams said that he had stressed the fact that Queensland was in every way entitled to consideration for inclusion in the contemplated expansion programme. In many parts of this State citrus fruits of excellent quality were produced and in many more districts soil and other factors were highly favourable for citriculture, whether under irrigation or natural rainfall conditions. If any proposed expansion had a particular relation to the needs of soldier settlement, Queensland would welcome a share in the allocation of the additional acreage in view.

Soy Bean Production.

Regarding the proposal of the Commonwealth to foster the growing of soy beans on a more extensive scale, Mr. Williams stated that this was unanimously approved by the Council. It was accordingly decided that a number of officers from State Departments of Agriculture—including one from Queensland—should be sent to America at an early date to gain first-hand information relative to the planting and harvesting and processing of this particular crop, for which there is apparently a big future in Australia.

Tobacco-growing.

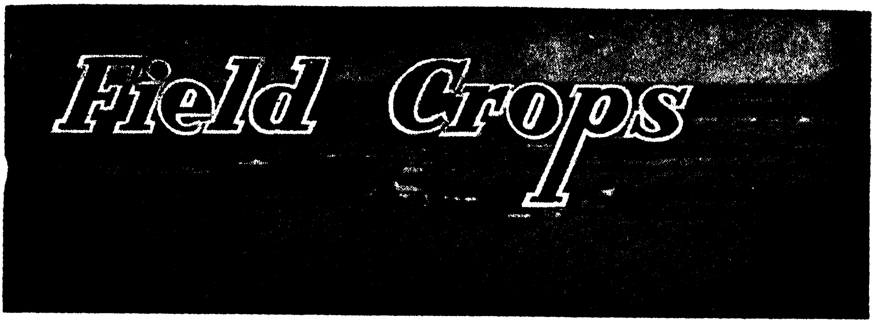
Production of tobacco of improved quality was a matter on which all State Ministers were agreed, added Mr. Williams, who again voiced the dissatisfaction of Queensland growers with present appraisal methods. He pressed for consideration of the setting up of a central marketing authority under the provisions of existing regulations. This he regarded as essential if guaranteed stabilized prices were to be obtained. He also impressed on other members of the Council that in Queensland, particularly in the northern tobacco-growing areas, high-grade leaf of first-class quality was being produced, and that if given the necessary encouragement large areas of very suitable land could be made available for the production, especially under irrigation, of practically unlimited quantities of tobacco of top grade and quality.

Farm Mechanization.

Speaking of farm mechanization schemes, Mr. Williams said he had again pointed out that on the smaller-sized farms machinery could only be used economically if centrally owned and operated. It was necessary also, he added, that much more should be done by all the Governments concerned to foster the introduction, development and testing of new types of farm machinery and contended further that there should be a closer liaison between the Commonwealth and State Governments in these matters if the success of farm mechanization projects were to be attained.

The future of district war agricultural committees also was considered by the Council, and it was decided that, having served their great war-time purpose, they should cease to function as from the end of this month, except where their retention for longer periods was found necessary. It was agreed, too, that the valuable services of these district committees to the Commonwealth, and to the primary industries in particular, during the difficult war years would be suitably recognized.

A proposal to arrange periodical interchanges of graduates in agriculture with other countries also was approved at the February meeting of the Australian Council of Agriculture.



Flue-curing Tobacco.

A. HAMILTON, Senior Adviser in Agriculture.

IN the production of bright tobacco, considerable experience is necessary, for there is no operation of greater importance than the curing of the leaf. The process demands the greatest care and attention to all details, and on the success of the curing depends very largely the monetary return which may be expected from the crop. Good leaf can be completely spoilt or considerably lowered in value by neglect in the curing process; while leaf of apparently poor quality can be much improved in value by skilful treatment.

To obtain the best results, it is essential that the leaf is picked at the proper stage of ripeness, carefully handled to minimise bruising, and cured with due regard to its body and texture.

Tobacco leaf which is under-ripe cannot be cured a bright colour and when it is saleable realises the lowest price of all grades. If leaf is over-ripe, or if through one cause or another has been allowed to remain on the plant beyond the stage of ripeness at which it should have been picked, an unsatisfactory cure will result. Depending on the degree of over-ripeness, all such leaf will cure an uneven colour and "brittle" in parts, faults which reduce considerably the value of the leaf.

As far as it is practicable to do so, leaves of the same body and texture should be cured together; provided always that the degree of ripeness is uniform throughout the barn. It is impossible to regulate the curing process to cure satisfactorily leaves of varying body and texture, and where a middle course is attempted in an endeavour to cure a barn of mixed leaf, all the leaf will be lowered in value.

Although it is impossible to lay down any hard and fast rule which will prove satisfactory in the curing of any number of barns, descriptively the process can be divided into three stages, namely:—

(1) Colouring of the leaf;

(2) Fixing the colour and killing the leaf;

(3) Drying the leaf right out.

The colouring stage may be aptly termed the artificial ripening of the leaf under favourable atmospheric conditions within the barn, the leaf remaining alive. During the second stage of fixing the colour and killing the leaf, atmospheric conditions within the barn are regulated to allow of more or less uniform colour being attained over the leaf. When practically full colour in the leaf has been assured the leaf is killed by drying out the last of the moisture from the blade of the leaf. The final stage is the simple evaporation of the moisture remaining in the veins and mid-ribs by increasing the temperature.

Colouring.

In commencing the first stage of the cure, both top and bottom ventilators should be tightly closed. Colouring of the leaf will progress most rapidly in a warm and humid atmosphere. The humidity within the barn at this early stage of the cure can usually be gauged by the experienced grower, but the use of a hygrometer will be found most helpful. During the colouring process the wet bulb should show a reading of from 3 to 4 degrees below that of the dry bulb. A greater difference between the two readings will indicate that the atmosphere of the barn is too dry, and moisture will have to be added. Additional moisture can usually be supplied by placing wet bags on the floor of the barn Direct wetting of the floor of the barn by hosing is not recommended, as this added moisture often proves troublesome later on in the cure when efforts are being made to drive off excess moisture from the barn.

No definite length of time can be given for the colouring period, as this will depend largely on the type of leaf, the soil and climatic conditions under which the crop was grown and the time of the year in which the leaf is being cured.

As a guide, however, the temperature in the barn should be kept between 90 and 100 deg. Fahr. until the colour has spread from the tips and sides of the leaves toward the mid-rib. At this stage the leaf should show roughly two-thirds colour: this degree of colour should be based on the bulk of the leaf in the barn and not on individual sticks placed on tiers low down in the barn.

Fixing the Colour and Killing the Leaf.

When the desired degree of colour has been obtained in the barn, both top and bottom ventilators should be opened to no more than one-quarter of their capacity. At the same time, the temperature should be gradually raised to 105 deg. Fahr. and held there until the tips of the leaves dry out and become firm to the touch. During this period of the cure, the wet bulb should show a reading of 8 degrees below that of the dry bulb. At this stage very little green should be showing in the leaf. When all leaf tips have become dry and firm to the touch the top ventilation is increased to about half capacity, allowing the bottom ventilation to remain at one-quarter capacity, and the temperature is gradually increased to 110 deg. Fahr. The temperature in the barn should be held at this level until the tips of the leaves begin to turn upwards and inwards toward the mid-rib. As a useful guide at this stage of the cure, the wet bulb should show 10 degrees below that of the dry bulb. Should some green still remain in the leaves at this stage the barn may be held at 110 deg. Fahr., but care should be taken to see that no "sponging" of the full coloured leaf in the barn is occurring. Should "sponging" of the leaf occur, both top and bottom ventilation should be immediately increased and the temperature raised about 10 degrees until all free moisture has disappeared from the leaf surfaces. When this free moisture has been driven off the temperature is allowed to fall back to 110 deg. Fahr. and the ventilation gradually reduced to one-half top and one-quarter bottom.

To fix the colour in the barn the temperature should be increased gradually to 115 deg. Fahr. and at the same time full ventilation both top and bottom given. The temperature is held at 115 deg. Fahr. until the edges of the leaves begin to curl inwards, then raised gradually to 120 degrees with full ventilation, and held until the web of the leaf has completely dried out.

When the web has been fully dried out the temperature can be raised more rapidly than previously—at the rate of 5 degrees an hour—to 130 deg. Fahr., while at the same time the bottom and top ventilation should be reduced to about half capacity.

The leaf is held at 130 degrees until the veins have dried out completely before attempting to raise the temperature sufficiently to drive all moisture from the barn.

Drying the Leaf Right Out.

The final stage of the cure is simply one of increasing temperatures and reducing ventilation to a minimum to permit of all moisture being expelled from the barn.

A rate of 5 degrees an hour should be employed in raising the temperatures from 130 degrees to 160 degrees while the top and bottom ventilation are gradually reduced until only a slight crack is allowed in the top ventilation and the bottom ventilation is completely closed.

With large, heavy-bodied leaf it may be found necessary to raise the temperature above 160 deg. Fahr., but in no instance should it exceed 180 deg. Fahr.

All moisture will have been driven from the leaf when the mid-ribs are dry and can be snapped between the fingers without bending.

The final stage of the cure, when all moisture has been expelled, is to draw the fire, open top and bottom ventilators, and throw open the door.

Pointers for Curing.

1. Endeavour to harvest leaf of the same degree of ripeness and maturity.

2. Endeavour, as far as is practicable, to fill the barn with leaf of even body and texture.

3. Do not string the sticks too heavily, especially if the crop is one of heavy-bodied leaf.

4. Do not overcrowd the sticks on the tier poles.

5. Never allow the temperature to rise above 100 deg. Fahr. when all ventilators are closed.

6. In cool weather use lower temperatures.

7. In wet weather start ventilation earlier, reducing bottom ventilation and increasing top ventilation.

8. Should hot, dry weather conditions prevail during curing, decrease top ventilation and increase bottom ventilation.

9. Do not raise temperature above 110 degrees until the tips of the leaves have all curled up.

10. Make sure that all stems and mid-ribs are thoroughly dried out, as moisture remaining in the stems will cause mould to develop in the bulks.

11. Opening of the barn door during curing operations should be reduced to a minimum. Avoid using a naked light in the barn whilst the leaf is drying out.

12. During the whole of the curing process avoid too rapid changes in temperature and endeavour to carry the cure through its various stages evenly and without undue haste in any one phase.

QUEENSLAND SHOW DATES.

Queensland Agricultural Show Societies are quickly moving again into active organization, and appended is a list of show dates, registered up to 10th January by the Queensland Chamber of Agricultural Societies, for 1946:—

MARCH.

Goombungee	16th
Pittsworth	19th and 20th
Millmerran	22nd
Oakey	27th and 28th

APRIL.

Toowoomba	2nd to 4th
Dalby	9th and 10th
Chinchilla	11th and 12th
Miles (Show and Bushmen's Carnival)	17th and 18th
Mount Perry	27th
Nanango	26th and 27th
Roma	30th, and 1st and 2nd May

MAY.

Monto	1st and 2nd
Kingaroy	1st, 2nd, and 3rd
Eidsvold	6th and 7th
Murgon	9th, 10th, and 11th
Beaudesert	8th and 9th (Camp Draft 10th and 11th)
Kilkivan	17th and 18th
Esk	17th and 18th
Gympie	22nd and 23rd
Biloela	23rd and 24th
Laidley	24th and 25th
Blackbutt	24th and 25th

JUNE.

Kalbar	1st
Boonah	7th and 8th
Childers	10th and 11th
Lowood	14th, 15th, and 17th
Gin Gin	17th and 18th
Rockhampton	19th to 22nd
Mackay	24th to 27th
Toogoolawah	28th and 29th

JULY.

Proserpine	5th and 6th
Rosewood	12th and 13th
Gatton	19th and 20th
Cairns	23rd, 24th, and 25th
Yarraman	26th and 27th
Ipswich	30th and 31st, and 1st and 2nd August

AUGUST.

Lawnton	2nd and 3rd
R.N.A.	12th to 17th

SEPTEMBER.

Canungra	7th
Beenleigh	20th and 21st

OCTOBER.

Nerang	4th and 5th

ANT PROTECTIO

Pests of Cucurbit Crops.

A. W. S. MAY, Assistant Entomologist.

A NUMBER of insect pests attack cucumber, melon, pumpkin and other cucurbit crops, and sometimes they seriously interfere with the yields obtained from them. Only the pumpkin beetles and the leaf-eating ladybird, however, are likely to attain pest proportions each year in all parts of the State but outbreaks of other species tend to occur at frequent intervals and may be confined to a few farms in a district.

Cucurbit pests can be grouped according to the parts of the plant with which they are more commonly associated. The following key should simplify their identification in the field:—

I. FOLIAGE AND FLOWER PESTS:

1. Active, elongate beetles about one-quarter of an inch long; feeding on surfaces of young leaves and on the flowers, sometimes in swarms.
    - (a) Orange-yellow in colour with two large black spots on each wing cover .. .. **Banded Pumpkin Beetle.**
    - (b) Uniformly yellow-brown in colour .. **Plain Pumpkin Beetle.**
2. Sluggish, oval, yellow-brown beetles on upper surfaces of leaves, each about one-quarter of an inch long, and covered with black spots: yellowish, spiny larvae on the lower surfaces of the leaves .. .. **Leaf-eating Ladybird.**
3. Soft-bodied, greenish-black to black insects about one-tenth of an inch long, in dense colonies on under surfaces of leaves and the tips of runners; infested leaves curled and stunted .. **Melon Aphid.**
4. Yellow, fringe-winged insects, about one-sixteenth of an inch long, feeding on lower surfaces of leaves, which are silvery and distorted; plants sometimes stunted .. .. **Onion Thrips.**
5. Minute, greenish-brown to reddish mites feeding on the under surface of leaves, which are yellowish and mottled .. .. **Red Spider.**
6. Yellowish-green caterpillars, feeding on the under surfaces of the leaves, about one inch long when full grown .. **Cucumber Moth.**

II. STEM AND FRUIT PESTS:

1. Cream-coloured grub tunnelling inside, and producing a swelling of the stem; about half an inch long when full grown .. .. .. **Cucurbit Stem Borer.**
2. Green, shield-shaped bug, about half an inch long .. .. **Green Vegetable Bug.**
3. Pale-brown to brownish-black, shield-shaped bug, about half an inch long .. .. **Cucurbit Shield Bug.**
4. Dull-black, elongate bugs with a red band behind the head and reddish spots on under-side of body; about three-quarters of an inch long .. .. **Black Passion Bug.**
5. Yellowish maggots inside ripe or ripening fruit .. **Cucumber Fly.**

PUMPKIN BEETLES.

Two insects, the banded pumpkin beetle* and the plain pumpkin beetle†, are commonly referred to by farmers as pumpkin beetles.

---

* *Ceratia hilaris* Bd.

† *Rhapidopalpa abdominalis* Fabr.

Although they differ markedly in colour, they frequently occur together on the same host plant and have very similar habits. Pumpkin beetles are particularly injurious to the seedlings, flowers and small fruit of cucurbit crops. Spring plantings of rock melons, squashes, marrows and pumpkins are often attacked shortly after germination when a relatively small number of beetles on each plant can defoliate and destroy the seedlings. Once runners are formed, the crop can be considered safe from this particular danger. The growth of established plants, however, may be severely checked by the beetles feeding on the leaves, flowers and newly formed fruit. The insects show a distinct preference for the younger leaves and tendrils on the terminals, and often cluster together when feeding. The latter habit is so characteristic that on infested plants some leaves may be completely destroyed except for the main veins (Plate 38) while others show little or no sign of injury. Beetles feeding on the flowers interfere with fruit setting and young fruit eroded on the surface by the pest may wither and eventually fall from the plant. The latter type of damage is particularly common in chokos. In the early stages of fruit formation, the damage to the flowers and newly formed fruit may ruin any prospects of an early crop.

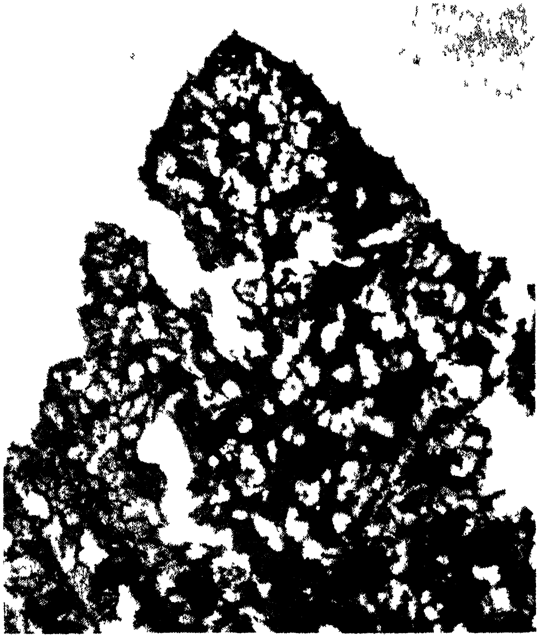


Plate 38.

BANDED PUMPKIN BEETLE.—Portion of infested rockmelon leaf.

The larvae feed on the roots which become swollen, discoloured and misshapen to such an extent that the growth of the plant may be checked. They also penetrate the lower surfaces of fruits in contact with the ground and produce rind blemishes through which secondary rot fungi can enter the tissues when the fruit ripens.

Life History and Habits.

The banded pumpkin beetle is orange-yellow in colour with two large black spots on each wing cover. It measures a quarter of an inch in length and is about twice as long as it is broad. The plain pumpkin beetle is slightly larger and more slender than the former species and can readily be distinguished from it by its uniform yellowish-brown colour.

Though the adults of the two pumpkin beetles differ a great deal in their appearance, their respective life histories and habits are very similar. The small, oval, yellow eggs are laid singly or in small groups on dead leaves or small clods under the food plants. After approximately ten days, the cream-coloured larvae hatch from the eggs and attack both the main root system and any subsidiary roots arising from the lower part of the stems. The long, narrow larvae only penetrate a short distance into the root and the greater part of the body remains outside the surface where it is easily seen when infested roots are examined. Fruits resting on the ground are also attacked, the larvae tunnelling into the rind for distances up to one-quarter of an inch; they also protrude from the surface. After approximately five weeks, the larvae, then one-half inch in length and full-grown, pupate in the soil at depths varying from 1 to 3 inches. The adult beetles later emerge from the pupae.

During hot weather, pumpkin beetles are very active and readily leave the plants when disturbed but they are relatively sluggish during cloudy or cool weather. At night they shelter in any dense foliage in, or near, their food plants. In winter, the beetles congregate among dead vegetation or under the bark of standing trees until warm weather in spring induces them to emerge.

Control.

Pumpkin beetles are particularly troublesome during the early life of the plant, and protective measures should be applied immediately after the seedlings appear above the ground. A dust containing 25 per cent. of arsenate of lead in a hydrated lime or kaolin carrier kills many of the beetles feeding on the leaves and at the same time acts as a deterrent against reinfestation either by adults disturbed during treatment or migrating into the field from outside. The seedlings should be dusted when the air is still, preferably in the early morning when dew is present on the plants. Arsenate of lead may also be used as a spray at a strength of 1½ lb. of the powder to 50 gallons of water; the spray, however, does not possess the deterrent properties of the dust and may prove inefficient for the protection of seedlings. It should be used therefore only after the crop has reached the flowering stage.

In order to maintain a protective coating of the insecticide on fast-growing seedlings, treatments should be applied at intervals of five to seven days, and as soon as practicable after rain has fallen. The time interval between applications may be increased to ten days when beetle populations are relatively low. The possibility of plants being killed decreases as the seedlings grow and is relatively slight when the main runners are about 12 inches long, i.e., approximately four to five weeks after germination. The beetles then tend to confine their attention to the rapidly developing flowers and young fruit. The luxuriant foliage present on the plants at later stages of growth interferes with the application of insecticides and reduces their effectiveness. However, if the dust has been properly applied during the seedling stages, vigorously growing plants should not suffer a great deal from the surviving beetle population. Treatment should be continued, if the pests are troublesome, though care must be taken to prevent the accumulation of poisonous residues on the fruit as it approaches maturity. The adoption of cultural practices which ensure continuous, vigorous plant growth are obviously desirable for they do much to offset the damage caused by the pest.

LEAF-EATING LADYBIRD.

Most ladybird beetles are predatory on other insects but one, the leaf-eating ladybird*, feeds on the foliage of pumpkins and related crops, potatoes, and several weeds Migrations from weed hosts are often responsible for outbreaks in cultivated crops.

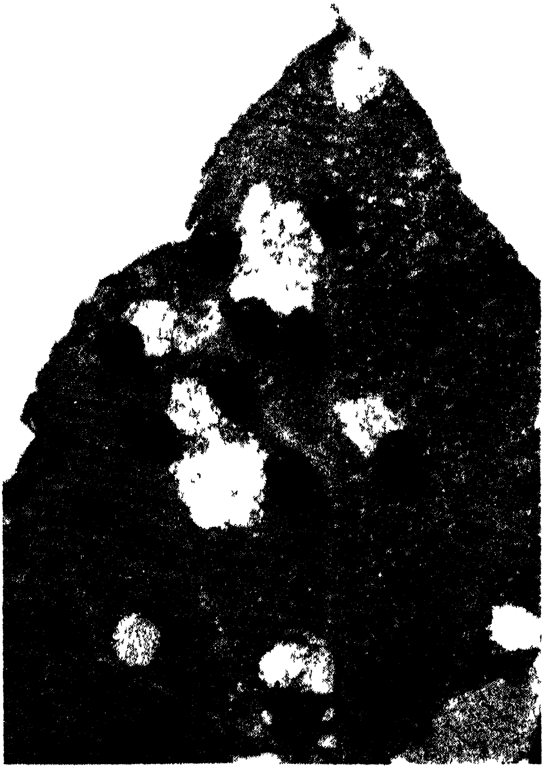


Plate 39.

LEAF-EATING LADYBIRD.—Portion of infested rockmelon leaf.

All stages of the insect occur on the above-ground portions of the host plant, the larvae and the adults feeding principally on the foliage, though the flowers and developing fruit may also be injured. Unlike the pumpkin beetles, adults of the leaf-eating ladybird do not "swarm" and seedling damage is seldom as severe as that caused by the former pests. The adults feed mainly on the upper surfaces of the leaves

---

* *Epilachna 28 punctata* Fabr.

(Plate 39) but the sluggish larvae are confined to the under sides of the leaves where they destroy the green tissues and leave the veins linked together with a grid-like, almost colourless film. In severe outbreaks the majority of the older leaves may be almost completely destroyed and the injury not only lowers the yield but also exposes the maturing fruit to the sun and thus induces scald. The larvae also injure the rind of the fruit.

Life History and Habits.

The leaf-eating ladybird (Plate 40, fig. 1) is oval in shape, approximately a quarter of an inch in length, and yellowish-brown in colour, but the wing covers are marked with from 24 to 28 conspicuous black spots. The movements of the beetle are rather sluggish, and it does not fly readily. The elongate-oval, yellowish eggs (Plate 40, fig. 2) are laid in clusters on the under-surface of the foliage or developing fruit. From the eggs, the yellowish larvae emerge and feed on the nearby leaves. After about three weeks they are full grown, and measure one-third of an inch in length, the body being profusely covered with dark many-branched spines which give them a hairy appearance (Plate 40, fig. 3). Pupation (Plate 40, fig. 4) occurs on the host plant or in any adjacent trash. The whole life cycle is completed in about four weeks and all stages of the pest may be present on the food plant at the same time.

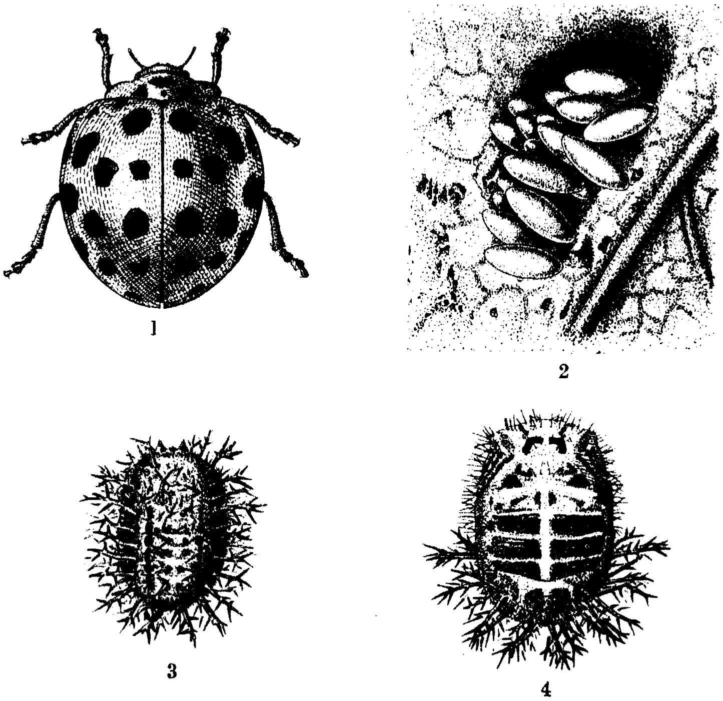


Plate 40. [*Drawings by William Manley.*

LEAF-EATING LADYBIRD: Fig. 1.—Adult beetle × 5. Fig. 2.—Egg mass × 5. Fig. 3.—Larva × 5. Fig. 4.—Pupa × 5.

Control.

Though the seedling destruction caused by the leaf-eating ladybird is normally not important, any infestation during the early life of a crop should be controlled; otherwise the pest may get out of hand during the later stages of crop growth. Routine applications of an arsenate of lead dust or spray, such as those prescribed for the control of the pumpkin beetles, will also keep the leaf-eating ladybird in check if the insecticide is applied thoroughly and both the upper and lower leaf surfaces are covered with the poison. Once fruiting commences, arsenical dusts or sprays must be used with considerable care in order to avoid the accumulation of residues on the fruit. Sprays containing 0·1 per cent. D.D.T. or dusts containing 2 per cent. D.D.T., however, may be used for the control of the pest until three weeks before harvesting begins.

MELON APHID.

Colonies of the melon aphid*, a small greenish-black to black insect about one-tenth of an inch in length, are nearly always present in cucurbit crops at some stage of their development (Plate 41). Predators, such as hover fly larvae and ladybird beetles, together with a number of wasp parasites, normally keep the aphid under control but occasionally the pest increases very rapidly and causes considerable injury to the crop. Should outbreaks occur when plants are in the seedling stages, the leaves curl and growth is checked. In older crops, vine development is retarded and yields may be reduced. These aphids, like most other species, secrete a sticky substance known as honey dew on which sooty mould fungi grow. The honey dew accumulates on the lower parts of the plant and sometimes makes the crop very objectionable to handle.

Plate 41.
MELON APHID.—Portion of infested squash leaf.

---

* *Aphis gossypii* Glov.

Control.

Rapid growth is desirable in young cucurbit plants and control measures should therefore be applied in the early stages of growth if the pest is at all abundant. A nicotine sulphate spray, prepared by adding one-half pint of nicotine sulphate to 50 gallons of water in which 2 lb. of soft soap have been dissolved, or a nicotine dust containing 3 per cent. nicotine, may be used. Two applications of the insecticide are usually needed to control the pest, the second being applied one week after the first.

ONION THRIPS.

Onion thrips* are small, yellow, fringe-winged insects which are commonly found on cucurbit crops, more particularly cucumbers. They are about one-sixteenth of an inch in length and both adult and nymphal stages occur together in colonies on the under surfaces of the leaves where they feed on and destroy the green tissues. The infested parts of the leaves assume a silvered appearance but this is frequently accompanied by both leaf distortion and delayed development of the plants. Severe attacks may be fatal to seedlings and young plants.

Control.

Nicotine dusts or sprays such as those used for the control of the melon aphid will keep the onion thrips in check. Regular treatment of the young plants is essential in some parts of southern Queensland where cucumbers are grown extensively.

RED SPIDER.

Red spider† may attack all cultivated plants in the cucurbit family. Infested plants exhibit an unthrifty appearance with pale spots on the foliage. As the infestation spreads from the vicinity of the main veins

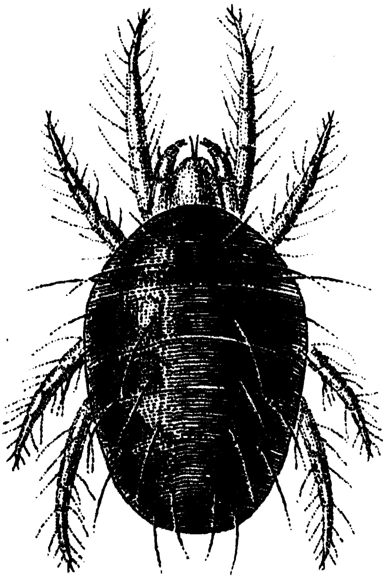


Plate 42. [*Drawing by William Manley.*

RED SPIDER × 100.

---

* *Thrips tabaci* Lind.

† *Tetranychus urticae* Koch.

where it usually begins, the whole leaf acquires a yellowish colour and eventually withers. The consequent loss of leaf retards growth, exposes the fruit to the sun, and weakens the plants. When the under surface of an infested leaf is examined, the small mites (Plate 42) may be seen as minute greenish-brown or reddish spots moving over the surface and, if the outbreak is severe, the cast skins give the surface of the older leaves a dusted appearance. Red spider attacks reach their greatest intensity in cucurbit crops during spring and early summer; heavy rain or prolonged low temperatures usually reduce the numbers on the plants very rapidly.

Life History and Habits.

The small, spherical, almost transparent eggs of the red spider are laid on the under surface of the leaves, usually alongside the veins. Hatching occurs in four or five days, the young mites being almost colourless at first though they later acquire a greenish-brown tinge, which becomes more distinctive as they approach maturity. The adult females vary in colour, both greenish-brown and reddish individuals being found on the same plant. They possess four pairs of legs, a short, rounded body, and measure approximately one-sixtieth of an inch in length. The adult male is somewhat smaller than the female, is less rounded, and is usually salmon coloured. During summer, the life cycle of the pest is completed in less than two weeks.

Control.

Red spider outbreaks can be controlled by the use of dusts or sprays containing sulphur provided treatment is thorough and the insecticide reaches the under surfaces of the leaves where the mites occur. The dusts should contain at least 30 per cent. of sulphur; lime sulphur sprays may be applied at a dilution of 1 in 60, while commercial wettable and colloidal sulphurs may be used at strengths recommended by the makers. Once the pest has become thoroughly established in the crop it is difficult to eradicate, for the mites are largely confined to the under surfaces of the leaves, many of which lie close to the ground and are difficult to cover with the insecticide. Dusts usually give a better coverage than sprays and are more generally used, but no matter what method of treatment is applied, control measures should commence in the early stages of an attack and continue at regular intervals of approximately two weeks, at least in valuable crops such as cucumbers. Since red spider breeds on a number of weeds, such sources of infestation should be eliminated whenever it is practicable to do so.

CUCUMBER MOTH.

In spite of its common name, the cucumber moth* is not an important pest of cucumbers; watermelons are much more commonly attacked. The insect, however, has been reared from most cucurbit crops, including the guada bean, which is actually a type of marrow. On damaged plants, the larvae occur in considerable numbers on the under sides of the leaves, where they normally feed. At first the surfaces of the leaves are eroded, but later large gaps appear and pieces of the ragged leaves may be bound together with frass-cluttered silk spun by the older larvae. In severe outbreaks, most of the foliage is destroyed and the larvae may then enter the stem and burrow inside it. Sometimes, irregular shaped holes are gouged out of the fruit, particularly at the stem end, by several larvae working close together. Attacks are apparently most common after heavy rain and sometimes coincide with those of the leaf-eating ladybird.

---

* *Phacellura indica* Saund.

Life History and Habits.

The parent moth measures approximately one inch across the outstretched wings, which are translucent white in colour and fringed with a blackish-brown border (Plate 43). The abdomen characteristically ends in a brush of long golden-yellow scales. Small, round eggs are laid singly by the parent moths on the under surfaces of the leaves and from them emerge larvae which are at first almost white in colour, but later become yellowish-green. They reach maturity in approximately three weeks and are then almost one inch in length. Pupation takes place in light, silken cocoons spun by the larvae inside shelters of tied leaves or leaf fragments. Approximately five days after the commencement of pupation, the adult moths emerge from the light-brown pupae and escape to the open, where they mate and commence another generation.

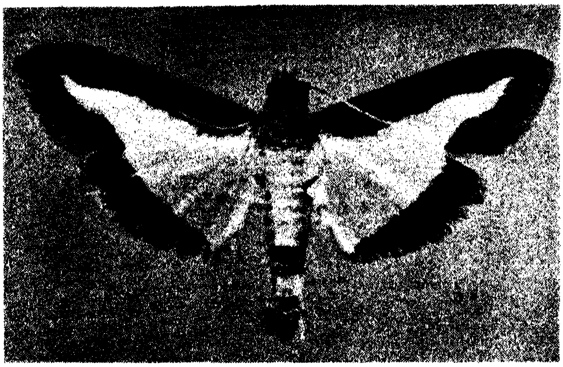


Plate 43.
CUCUMBER MOTH × 3.

Control.

When insecticides are regularly used for the control of other cucurbit pests such as the pumpkin beetles and the leaf-eating ladybird, little trouble should be experienced with the cucumber moth. A dust containing 25 per cent. of arsenate of lead, or a spray containing 1 lb. of arsenate of lead in 50 gallons of water gives good control of the pest if the under surfaces of the leaves are covered with the insecticide. More than one application may be needed when leaf webbing is extensive. Sprays containing 0·1 per cent. D.D.T. and dusts containing at least 1 per cent. D.D.T. should also give good control of the pest.

CUCURBIT STEM BORER.

The cucurbit stem borer* is a common pest of melons and some related plants, the stems of which are attacked by the immature stages of the insect. Infested plants show no conspicuous symptoms. An odd leaf, usually a lower leaf, on young plants may collapse owing to the activity of the grub in the leaf stalk. In older plants, scars on the stem indicate points of larval entry into the tissues. Normally, cucurbits make such rapid growth when they are grown under favourable conditions that they flower and bear a crop even when the stem borer attacks are very heavy. In rock melon crops, larvae may be found in the stems of most plants at the end of the cropping period and it is therefore assumed that both the life of the crop and the yields obtained from it are then reduced by the pest.

---

* *Apomecyna histrio* Fabr.

Life History and Habits.

The stem borer is the larval stage of a longicorn beetle which is about one half-inch in length, and slaty-grey in colour with a number of white spots arranged in three evenly shaped V markings across the wing covers (Plate 44). The antennae, like those of most insects of this kind, are long. The eggs are laid singly in growth cracks or other scars along the stem of the host plant. The newly emerged larva tunnels within the stem and works steadily downwards toward a node. Feeding induces a swelling in the stem and this becomes more pronounced as the larva approaches maturity within the feeding tunnel which is packed with glutinous waste material. The full-grown, cream-coloured larva is approximately three-quarters of an inch in length, elongate, with distinct grooves between the segments. Before pupating, it constructs a fibrous cocoon inside the stem in which it turns to the pupa from which the adult beetle later emerges. The habits of the insect are not fully known, but there may be two or three generations each year.

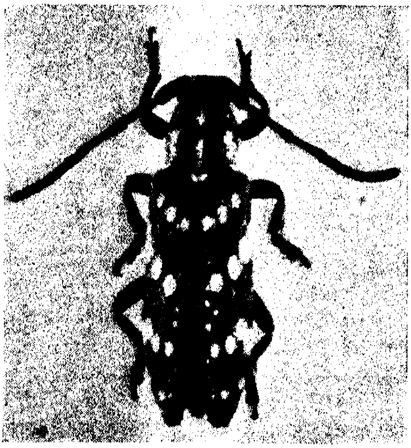


Plate 44.
CUCURBIT STEM BORER × 5.

The adult beetles occur on most cucurbit crops and have been reared from larvae in melons, pumpkins, and marrows. They may erode the bark of the growing plant, but this type of injury is seldom important.

Control.

Insecticides cannot at present be recommended for the control of the pest, but the risk of infestation may be lessened by rooting out and

burning the remains of cucurbit crops when the fruit has been harvested. Any larvae or pupae in the stems will then be destroyed and the chances of the insect becoming numerous should be reduced.

SHIELD BUGS AND FRUIT BUGS.

A number of bugs are well-known pests of cucurbit crops. They include the green vegetable bug*, the cucurbit shield bug†, and the black passion bug‡. All possess sucking mouth parts with which they pierce the plant tissue and suck out the juice. At these punctures, water-soaked lesions develop which later cause malformations in the growth of the part of the plant attacked. If the infestation is heavy the vigour of the plant and its ability to bear fruit may be affected.

Life Histories and Habits.

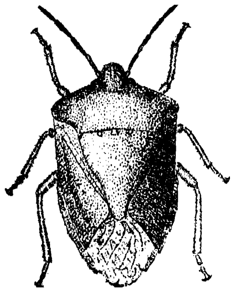


Plate 45.
GREEN VEGETABLE BUG × 2.
[*Drawing by William Manley.*

The green vegetable bug (Plate 45) is pale green in colour, shield shaped, and measures approximately half an inch in length. The cream-coloured, barrel-shaped eggs are laid in neatly arranged groups on the under surfaces of the leaves. From the eggs, bright-orange nymphs emerge within a week and remain clustered together for a few days before dispersing over the plants. The nymphal stages are flattish-oval and often vividly coloured with black, green, white, yellow and red markings which change to softer shades before the insect reaches the green adult stage. Several generations occur during the year and the pest overwinters in the adult stage. Beans and tomatoes are the principal host plants of the green vegetable bug, but cucurbits are sometimes infested. Both the main stem and the fruits of rock melons, cucumbers, and related plants may be attacked.

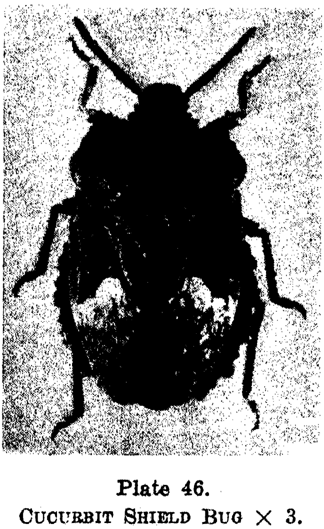


Plate 46.
CUCURBIT SHIELD BUG × 3.

---

* ***Nezara viridula*** L.

† ***Megymenum insulare*** Wwd.

‡ ***Leptoglossus bidentatus*** Montr.

Cucurbit shield bugs (Plate 46) vary in colour from pale brown to brownish-black, and measure half an inch in length. They are sluggish insects which often congregate in large numbers among the dead leaves and under the fruit. The pearly-white eggs are oval in shape, from three to twelve being laid side by side in a continuous chain on the under surfaces of the leaves and fruit, or on the dead leaves lying below the plant. The nymphs are generally greyish-blue with faint yellowish markings, but shades of brown are not uncommon. Cucurbits are the main hosts of the cucurbit shield bug which first appears in the young crop as isolated individuals feeding on the stems and leaf stalks of the plants. Later in the season, large populations sometimes infest the plants, frequently in only part of the field.

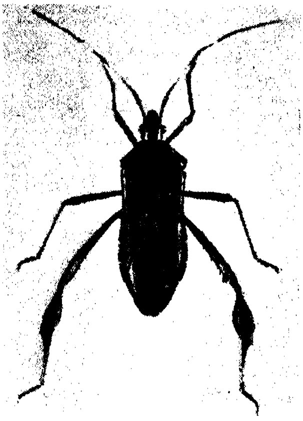


Plate 47.
BLACK PASSION BUG × 1½.

The black passion bug (Plate 47) is a dull-black, rather elongate insect measuring three-quarters of an inch in length, the prevailing colour being broken by a transverse red band just behind the head and several reddish spots on the under side of the body. The insect feeds on many plants, including passion fruit, citrus and cucurbits such as cucumbers and melons. In coastal areas where outbreaks usually occur, large numbers of both adult and nymphal stages cluster on the fruit, damaging the rind and the underlying flesh.

Control.

Control of plant and fruit bugs on cucurbit crops is difficult, mainly because the dense foliage of well-grown vines gives a great deal of protection to the insects. Liberal applications of a 5 per cent. nicotine dust act as a deterrent against the adult shield bugs, and kill some of the nymphs, but frequent applications are necessary to achieve reasonable control. Recent work suggests that a spray containing 0·1 per cent. D.D.T. will be more effective in controlling shield and other bugs than the insecticides formerly used for this purpose.

CUCUMBER FLY.

The cucumber fly*, which is the common fruit fly attacking the fruit of cucumbers, melons, squashes, chokos and pumpkins, is somewhat larger and lighter in colour than the better known Queensland fruit fly*. Tomatoes are also sometimes infested by the maggots of the insect. The flies may become numerous during the mid- and late-summer months and eggs are laid in mature, sunburnt or damaged fruits. If populations are high, eggs may also be laid in fruit which is still immature. These eggs, unlike those laid in ripe fruit, seldom hatch, but calloused areas appear in the rind at each egg-laying puncture and involve the adjacent tissues. Such calloused areas in the young fruit are later associated with deformities. Normally, however, the injury is limited to fruits which are close to, or have reached maturity, and the pest therefore attracts attention during and after harvesting.

---

* *Austrodacus cucumis* Fr.

Life History and Habits.

The life history of this pest is much the same as that of the Queensland fruit fly. The elongate-oval eggs are laid in groups beneath the rind and the cream-coloured maggots emerging from them tunnel through the tissues of the fruit. Larval development is completed in approximately one week and pupation then takes place in the soil. Later, the adult cucumber flies force their way to the surface of the soil and take to the wing. The whole life cycle may be completed in as short a period as two weeks and populations therefore increase rapidly when conditions are suitable for the pest.

Control.

Only hygienic control measures can be used against this fruit fly. All material in which the pest can breed should be eliminated as far as possible, damaged, sunburnt, over-mature and infested fruit being collected at weekly intervals and fed to stock or otherwise destroyed.

ROUTINE CONTROL MEASURES.

The severity of insect attacks on cucurbit crops can be somewhat lessened by careful attention to the following cultural practices which promote healthy and vigorous growth of the vines:—

(*a*) The land should be worked to a fine tilth before planting and, later, weed growth developing in the rows should be checked.

(*b*) Vigorous growth of the vines should be maintained by frequent cultivation, the use of suitable fertilizers, and judicious watering if irrigation facilities are available.

(*c*) Insecticides should be applied at regular intervals after the seedlings appear above the ground, at least in valuable crops such as cucumbers and melons.

(*d*) All damaged, over-ripe and sunburnt fruits should be removed and destroyed at weekly intervals after the commencement of harvesting.

(*e*) Crop residues should be burned as soon as the fruit has been harvested.

---

* *Strumeta tryoni* Frogg.

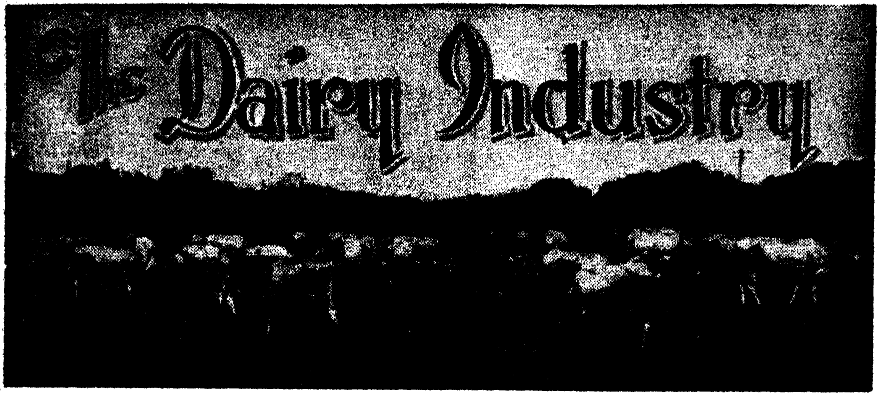
Growers of cucurbit crops are seldom faced with the simple problem of controlling a single pest, for two or more species, such as the onion thrips and red spider or pumpkin beetles and the leaf-eating ladybird, are often active at the same time. A relatively unimportant pest in one district, such as the cucumber moth, may cause considerable damage in another. Such peculiarities in the insect pest position on cucurbit crops can be dealt with most satisfactorily by a basic control programme which will cope with those species normally encountered within a particular district, applications of special insecticides being reserved for pests which occur less frequently.

For economy of labour and materials, insecticides can sometimes be applied together with fungicides in a combined dust or spray. Commencing soon after the seedlings appear above the ground, weekly dustings with a mixture containing five parts of arsenate of lead, three parts of copper carbonate, six parts of sulphur and six parts of kaolin will ensure seedling growth free from leaf-eating insects and red spider, and afford protection against downy mildew infection. A proprietary dust of this kind would carry the following analysis on the label:—7·75 per cent. arsenic pentoxide (As_2O_5) as arsenate of lead, 7·5 per cent. copper (Cu) as copper carbonate, and 30 per cent. sulphur as powdered sulphur. A combination spray containing cuprous oxide mixture (3 in 40), or one of its commercial equivalents, with lead arsenate (1½ lb. to 40 gallons) and colloidal or wettable sulphur at the strength recommended by the manufacturer may also be used, but it is not as satisfactory as the dust for insect control purposes. The copper fungicide must be included in dusts and sprays applied to rock melons and cucumbers, both of which are very susceptible to downy mildew; they may, however, be omitted in other cucurbit crops. If aphids or thrips appear in the crop they may be checked with a 3 per cent. nicotine dust or a nicotine spray (½ pint nicotine sulphate, 2 lb. soap, and 50 gallons water).

The above formulae, containing sulphur, are particularly suited to areas where red spider outbreaks are common. However, in those districts where red spider attacks are unusual, sulphur can be omitted from the dust or spray. The alternative dust, in such cases, would contain five parts arsenate of lead, three parts of copper carbonate and twelve parts of kaolin. A proprietary dust of this kind would carry an analysis as follows:—7·75 per cent. arsenic pentoxide (As_2O_5) as arsenate of lead, and 7·5 per cent. copper (Cu) as copper carbonate. Supplementary applications of a sulphur dust may be needed if and when red spider or powdery mildew are seen on the vines.

As the fruit develops and approaches maturity, arsenate of lead should be omitted from both dusts and sprays. However, regular applications of a copper fungicide may be continued as a protection against downy mildew infection, and sulphur dusts or sprays may still be needed to control outbreaks of powdery mildew and red spider.

Although growers can mix their own dusts to the above formulae, such a practice is only feasible where facilities for accurately weighing and thoroughly mixing the ingredients are available. Generally, it is more convenient for growers to purchase the ready-mixed dusts marketed by many proprietary firms for the control of pests and diseases in cucurbit crops.



Water and Salt Control in Butter-making.

L. A. BURGESS, Dairy Technologist.

THE method of purchasing cream for butter-making as "commercial butter" is based on the quantity of butter which specified tables show should be obtained from it. It is unfortunate that this method of payment has distracted the attention of a large number of those engaged in the butter industry from the fact that it is really butter-fat which is bought. This is the only constituent which is of any importance so far as butter-making is concerned, the process of churning consisting of obtaining the fat in a granular form so that the remainder of the cream—that is, the buttermilk—can be removed. The grains of fat are then consolidated, usually with the addition of salt as a flavouring agent and mild preservative, and the resultant product is the butter of commerce. Legal standards strictly limit the percentages of the non-fatty constituents and most countries have set a minimum percentage of fat which butter shall contain. It is therefore quite obvious that the fat is the real basis on which cream is purchased and butter is sold. This being so, it is surely equally obvious that an efficiently managed factory should make as much butter as possible from the fat received. This involves keeping the fat losses down to a minimum.

Sources of Fat Losses.

Careless handling of cream can cause much spillage; churning at a high temperature or shortly after pasteurization raises the fat losses; incomplete churning, such as churning to an unnecessarily small grain, results in many fat globules not attaining grain size; coarse or broken strainers allow much grain butter to be lost; inefficient moisture and salt control results in much fat being given away for no extra return; inefficient packing means that extra butter is given away for which no payment is received. These are the major sources of fat losses in butter factories, the most extensive losses being due to (*a*) the fat lost in the buttermilk, normally amounting to 1 to 1½ per cent. of all fat received, and (*b*) inefficient moisture and salt control. The former loss cannot be avoided or appreciably reduced, but carelessness can increase it considerably. The latter losses are definitely avoidable, because efficient moisture and salt control are under the direct control of the butter-maker.

TABLE 1.

SHOWING HOW WATER AND SALT AFFECT THE COMPOSITION OF BUTTER AND FACTORY RETURNS FROM BUTTER SALES.

Analysis of Butter.				Annual Output.		Gross Receipts from Butter Sales.		Receipts per lb. Fat.	
Water.	Salt.	Curd.	Fat.	Fat.	Butter.	@165/- cwt.	@ 200/- cwt.	@ 165/- cwt.	@ 200/- cwt.
%	%	%	%	Tons.	Tons.	£	£	Pence.	Pence.
15·7	1·5	0·8	82·0	820	1,000	165,000	200,000	21·56	26·13
15·2	1·0	0 8	83·0	820	987 95	163,012	197,590	21·30	25·82
14 5	0 7	0·8	84·0	820	976 19	161,071	195,238	21·05	25·51

Table 1 has been prepared to illustrate the way in which inefficient water and salt control can cause serious fat losses. The first section of the table shows how low percentages of water and salt cause the percentage of fat in the butter to rise. While the position has markedly improved in the course of the last three or four years it is unfortunately true that butters containing over 83 per cent.—sometimes as much as 84 per cent.—of fat are still being marketed. The second section of the table shows the quantity of butter which would be manufactured in each case, the basic figure being 820 tons of fat. It will be noted here that when butter containing 84 per cent. of fat is produced, the quantity of butter made is 24 tons less than if it contained 82 per cent. of fat. The effect of this on the gross receipts from butter sales is shown in the third section, which shows that at the basic equalization price of 165s. cwt. the monetary loss amounts to £3,928, while at 200s. cwt. (the gross returns from sales and subsidies) the loss amounts to £4,762. The fourth section of the table shows the figures from the third section reduced to receipts per lb. of fat sold. On this basis, the loss amounts to one half-penny per lb. of fat at 165s. cwt., and three-fifths of a penny per lb. at 200s. cwt. Such losses are more than an important industry such as the butter industry should be expected to stand. The remedy is in the hands of the shareholders and directors of the dairy companies, who can insist on complete efficiency in moisture and salt control in their factories

Methods of Control.

Many charts have been published to assist butter-makers to control the water and salt content of butter. They may differ in minor details, but all have the same basic principles. The quantity of butter which the particular churn of cream will produce should be known fairly accurately, i.e., to within 56 lb., or 1 box. This is best done by actual measurement and a fat test of the cream which is run into the churn. The cream can be measured in various ways, the use of a graduated dip rod in the cream vat being the most satisfactory. The fat test of the cream in the vat may be done at any time prior to churning, the important points being that the cream be thoroughly mixed before the sample is taken and the fat test accurately performed. From these figures it is easy to calculate the quantity of butter which the churn will yield, the commercial butter tables being very convenient for the purpose. Knowing this, it is equally simple to calculate the weight of salt which should be incorporated to give any desired percentage and to calculate the quantity of water required to raise the percentage in the butter by any desired amount. It should be noted that the salt which is calculated in this way should be *incorporated* in the butter. This means that the salt should be weighed accurately and every ounce of salt added should be worked into the butter. There is no logical reason why salt should be added to the churn and an unknown proportion of it then drained or "washed" out. That results not only in a failure to attain the salt objective, but in waste of salt. Admittedly salt is fairly cheap, but the cumulative losses of salt over a year in a butter factory can amount to a very considerable sum. For example, take a factory producing 1,000 tons of butter a year. If salt is added at the rate of 2 per cent. of the butter, 20 tons of salt would be used. But if a quarter of this salt were lost the loss would be 5 tons a year, with an approximate value of £50, nearly £1 a week which is being thrown away. Cases are known where factories are using as much as 4 per cent. of salt, but only incorporating about 1 per cent. On a 1,000-ton basis the loss in these factories amounts to 30 tons of salt, or £300 a year. Surely this is worth saving; it is equivalent to a man's wages.

TABLE 2.

CHART SHOWING THE APPROXIMATE NUMBER OF 56 LB. BOXES OF BUTTER OBTAINABLE FROM VARIOUS QUANTITIES OF CREAM.

Cream. Imp. Gallons.	Fat Test of Cream.											Cream. Pounds.
	30%.	31%.	32%.	33%.	34%.	35%.	36%.	37%.	38%.	39%.	34%.	
200	13	13	14	14	15	15	16	16	17	17	17	2,000
220	14	15	15	16	16	17	17	18	18	19	19	2,200
240	16	16	17	17	18	18	19	19	20	20	21	2,400
260	17	17	18	19	19	20	20	21	22	22	23	2,600
280	18	19	19	20	21	21	22	23	23	24	24	2,800
300	19	20	21	21	22	23	24	24	25	26	26	3,000
320	21	21	22	23	24	24	25	26	26	27	28	3,200
340	22	23	23	24	25	26	27	27	28	29	30	3,400
360	23	24	25	26	27	27	28	29	30	31	32	3,600
380	25	25	26	27	28	29	30	31	31	32	33	3,800
400	26	27	28	29	30	30	31	32	33	34	35	4,000
420	27	28	29	30	31	32	33	34	35	36	37	4,200
440	29	30	31	32	32	33	34	35	36	37	38	4,400
460	30	31	32	33	34	35	36	37	38	39	40	4,600
480	31	32	33	34	35	37	38	39	40	41	42	4,800
500	32	34	35	36	37	38	39	40	41	43	44	5,000
520	34	35	36	37	38	40	41	42	43	44	45	5,200
540	35	36	37	39	40	41	42	43	45	46	47	5,400
560	36	38	39	40	41	43	44	45	46	48	49	5,600
580	38	39	40	41	43	44	45	47	48	49	51	5,800
600	39	40	41	43	44	46	47	48	50	51	52	6,000

Moisture control is dependent on accurate factory tests. For this purpose, the best possible balance should be provided and it should be placed on a rock-firm bench in a situation free from draughts and where it will not be affected by radiated heat, steam or water. Tests accurate to within 0.1 per cent. are required and this accuracy is easily attainable. The initial or first moisture test should be done before the butter is completely worked, yet the churn should be "dry" so that no unforeseen and unknown rise will be experienced from a wet churn.

At this point it is opportune to mention that churns which are not level, or are found to give butter of a higher water percentage at one point than another, are a menace and should not be tolerated. Modern churns properly installed are capable of turning out a remarkably uniform butter, and there should be little trouble from this cause if such churns are installed.

Having performed the initial test, the requisite quantity of water is *weighed* and added to the churn. The final working should be for at least 5 minutes, so that the water is completely incorporated. Any incompletely incorporated water will permit bacterial growth and cause streakiness in the butter. On no account should a second addition of water be made. Provided due care has been exercised, the butter will contain the desired salt and water percentages to within 0·1 per cent. It is unwise to strive for the ultimate in either water or salt control, as the experimental errors of sampling and testing amount to 0·1 per cent. It is suggested therefore that the objective for water content should be:

15·6 to 15·7 per cent. for churns of up to 20 boxes;
15·7 to 15·8 per cent. for churns of up to 30 boxes;
15·8 to 15.9 per cent. for churns of over 30 boxes.

The reason is that an error in calculation of 1 box in 20 will still permit the attainment of the desired percentage to within 0·1 per cent., but a greater error in calculation could result in a churn of "excess moisture" butter. The larger churns permit a greater margin for error without affecting the result by more than 0·1 per cent.

Tables 2, 3 and 4 have been prepared for the convenience of butter-makers, who usually have enough work to do without making extra calculations. Table 2 shows the quantity of butter in 56 lb. boxes which may be expected from various quantities of cream containing from 30 to 40 per cent. of fat. This chart may be found to slightly under-estimate the quantity of butter, a good "fault" as it is on the side of safety. Naturally, if more butter is expected than is actually obtained the danger of excess salt or excess moisture butter is increased, because more salt and water are added than should be the case For this reason, the estimates in the chart are conservative.

Table 3 shows the weight of salt which should be incorporated to give any desired percentage of salt from 1·0 to 2·4. It will be noted that

TABLE 3.
SALT CONTROL CHART.

Boxes of Butter.	Pounds of Butter.	Pounds of salt to be incorporated to give—							
		1·0%.	1·2%.	1·4%.	1·6%	1·8%.	2·0%.	2·2%.	2·4%.
10	560	6	7	8	9	10	11	12	14
12	672	7	8	10	11	12	14	15	16
14	784	8	10	11	13	14	16	17	19
16	896	9	11	13	14	16	18	20	22
18	1,008	10	12	14	16	18	20	22	24
20	1,120	11	14	16	18	20	23	25	27
22	1,232	12	15	17	20	22	25	27	30
24	1,344	13	16	19	22	24	27	30	32
26	1,456	15	18	21	24	26	29	32	35
28	1,568	16	19	22	25	28	32	35	38
30	1,680	17	20	24	27	30	34	37	41
32	1,792	18	22	25	29	32	36	39	43
34	1,904	19	23	27	30	34	38	42	46
36	2,016	20	24	28	32	36	40	44	48
38	2,128	21	26	30	34	38	43	47	51
40	2,240	22	27	31	36	40	45	49	54
42	2,352	24	28	33	38	42	47	52	56
44	2,464	25	30	35	39	44	49	54	59
46	2,576	26	31	36	41	46	52	57	62
48	2,688	27	32	38	43	48	54	59	65

1 lb. of salt per box will give 1·8 per cent. of salt. This figure may be taken as a basis for mental calculation, if an objective other than 1·8 per cent. is desired.

Table 4 is the moisture-control chart for use when the initial test ranges from 13·0 to 15·4 per cent. It is based on a final moisture of 15·7 to 15·8 per cent.

TABLE 4.

MOISTURE CONTROL CHART.

Boxes of Butter.	Pounds of Butter.	Pounds of water required to raise moisture to 15·7–15·8% when initial test is—												
		13·0.	13·2.	13·4.	13·6.	13·8.	14·0.	14·2.	14·4.	14·6.	14·8.	15·0.	15·2.	15·4.
10	560	15	14	13	12	11	10	8	7	6	5	4	3	2
12	672	18	17	16	14	13	12	10	9	8	6	5	4	2
14	784	22	20	18	17	15	14	12	10	9	7	6	4	3
16	896	25	23	21	19	17	16	14	12	10	8	7	5	3
18	1,008	28	26	24	22	20	18	16	14	12	10	8	6	4
20	1,120	31	29	26	24	22	20	17	15	13	11	8	6	4
22	1,232	34	32	29	27	24	22	19	17	14	12	9	7	4
24	1,344	37	34	32	29	26	24	21	18	16	13	10	8	5
26	1,456	41	38	35	32	29	26	23	20	17	14	11	8	5
28	1,568	43	40	37	34	31	28	25	21	18	15	12	9	6
30	1,680	47	43	40	36	33	30	26	23	20	16	13	10	6
32	1,792	50	46	43	39	35	32	28	25	21	17	14	10	7
34	1,904	53	49	45	41	38	34	30	26	22	19	15	11	7
36	2,016	56	52	48	44	40	36	32	28	24	20	16	12	8
38	2,128	59	55	51	46	42	38	34	29	25	21	17	12	8
40	2,240	62	58	53	49	44	40	35	31	26	22	17	13	8
42	2,352	65	61	56	51	47	42	37	32	28	23	18	14	9
44	2,464	69	64	59	54	49	44	39	34	29	24	19	14	9
46	2,576	72	66	61	56	51	46	41	36	30	25	20	15	10
48	2,688	75	69	64	59	53	48	43	37	32	26	21	16	10

A method of churning which has proved very satisfactory in some factories using these charts is outlined below. It is not suggested that these instructions are to be followed blindly, as certain makes of churn may be slower or faster working. In such cases, the times quoted should be modified in the light of experience, but on no account should the final working be less than 4 minutes; preferably, it should be longer than 5 minutes.

Butter-making Procedure.

The quantity of butter to be obtained from the churn should be known to within 1 box. Table 2, showing the number of boxes of butter obtainable from various quantities of cream, may be used for this purpose. It is better to slightly under-estimate the quantity of butter than over-estimate it.

Cream and wash water temperatures should be such as to allow at least 15 minutes' working. The times quoted in the following outline of procedure are based on 15 minutes' working and may therefore require modification.

Churn to a grain size which allows rapid and complete draining, using break water if desired.

Drain the grain butter *thoroughly.*

Close the drain cocks and add the quantity of salt obtained from the Salt Control Chart (Table 3). *Weigh* the salt.

Close the churn doors tightly and work for 8 minutes.

Drain off the brine, if any.

Work for 2 minutes to dry the churn and thus avoid an indefinite increase in moisture during the final working. A better and more representative sample of butter is also obtained for the initial test.

Take a representative sample of butter and test accurately for moisture (initial test).

From the Moisture Control Chart find the quantity of water required. *Weigh* out the required quantity of water and add to the churn.

Close the churn doors tightly and work for 5 minutes, or longer if necessary to finish.

◆

Washing Dairy Utensils.

P. McCALLUM, Dairy Officer.

WHEN visiting farms it is surprising how often it is observed that the correct method of washing dairy utensils is not practised. One of the most common faults noticed is that dairymen wash up in very warm water only without first rinsing the utensils in cold water. The water used to start with is as hot as can be comfortably borne by the hands. This method of washing dairy utensils is entirely wrong, as hot water tends to form a film on the surface of the utensils, especially when provision is made for a final sterilization with steam or boiling water.

The principles underlying the proper cleansing of dairy utensils are very simple and easily understood. In the first place, it is necessary to know something of the nature and composition of milk. Milk is a very complex secretion consisting of at least 70 different substances, the chief of which are water, butterfat, lactose (or milk sugar), casein, albumin, and mineral salts.

The milk fat, casein, and some of the salts are held in suspension in the milk, while the albumin, lactose, and most of the salts are held in solution in the water.

The lactose and most of the salts are almost entirely rinsed away in the cold water, which will also remove part of the fat and proteins. Butterfat occurs in the form of very minute globules, and some of these adhere to the surface of the utensils and require heat and an emulsifying agent (such as washing soda or caustic soda) before they can be washed away. Of the two proteins (casein and albumin) albumin, which is practically identical with the white of an egg, is readily and permanently solidified by the action of heat. Casein is in suspension in fresh milk and gives milk its white appearance, but it can be coagulated by the action of acid or rennet to form a solid curd, the hardness of which is increased by heating. Both these milk proteins possess considerable adhesive properties (casein is used in the manufacture of paints and glues), and if the preliminary cold-water rinsing is omitted, they will stick firmly to dairy utensils where hot-water washing and steam sterilization will only harden them on to the surface. Once fixed on the surface, this film becomes the medium for bacterial growth, forming a protective layer on which the sterilizing heat has no effect. Similar protection is given by a layer of fat in the form of grease. Another risk with greasy utensils is that if left out in the sun this grease or fat becomes oxidised and is capable of causing tallowy cream. Greasy utensils also are a perfect base for dust particles which are usually present around the separator rooms and bails.

No Short Cut to Cleanliness.

There is no short cut in thorough cleansing of dairy utensils. Cleansing may be divided into three distinct stages:—

1. *Cold-water rinsing.* All utensils should be well rinsed with cold water as soon as possible after use. This is very important, because milk once it is allowed to dry is much harder to remove.
2. *Warm water and Soda washing.* Washing soda or any of the commercial cleansers may be used. The main purpose of a cleanser is to emulsify the fat so that it can be washed away. A good stiff brush (NOT cloths) should be used on each part to remove any traces of milk or cream. The warm water used need be only warm enough to be comfortable for the person washing up. For milking machines, caustic soda at the rate of one heaped teaspoonful to four gallons of water may be used instead of washing soda.
3. *Sterilization.* The utensils are then ready for sterilization. Where a steam sterilizer is installed, sterilization is easily and effectively done. If no steam sterilizer is available, a twelve-gallon copper boiler (as prescribed in the Regulations) is very satisfactory for near-sterilizing the equipment, and the best way to achieve this is by immersing the utensils in the boiling water.

After-care of the utensils is necessary, of course, to prevent recontamination. All utensils and containers should be allowed to dry on a metal draining rack, which should be in a dust-free place; if practicable, the rack can be in a sunny position.

TO TELL THE AGE OF A HORSE.

To tell the age of any horse, inspect the lower jaw, of course; the six front teeth the tale will tell, and every doubt and fear dispel. Two middle ''nippers'' you behold before the colt is two weeks old, before eight weeks two more will come; eight months the ''corners'' cut the gum. The outside grooves will disappear from middle two in just one year; in two years, from the second pair; in three, the corners too, are bare. At two the middle ''nippers''' drop; at three, the second pair can't stop; when four years old the third pair goes, at five a full new set he shows. The deep black spots will pass from view at six years from the middle two; the second pair at seven years; at eight the spot each ''corner'' clears. From middle ''nippers'' upper jaw, at nine the black spot will withdraw; the second pair at ten are white; eleven finds the '''corners'' light. As time goes on, the horsemen know the oval teeth three-sided grow; the longer get, project before, till twenty, when he knows no more.

—*From the Live Stock Journal (England).*

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which qualified for entry into the Advanced Register of the Herd Books of the A.I.S., Jersey, Ayrshire, and Guernsey Societies, production records for which have been compiled during the months of December, 1945, and January, 1946 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
MATURE COW (STANDARD 350 LB.).				
College Raceme	Queensland Agricultural High School and College, Lawes	9,243·1	396·782	Dulcimah Disraeli
White Park Polly 19th	W. T. Savage, Barnesmore	9,884·4	391·141	White Park Ronald
White Park Victoria 2nd	W. T. Savage, Barnesmore	8,932·45	387·202	White Park Ronald
Euroa Streamline 2nd	P. R. Emery, Dallarnil	8,694·75	363·346	Railway View Fussy's Banker
Rhodesview Beauty 20th	W. Gierke and Sons, Helidon	7,483·7	357·334	Fairvale Major
SENIOR, 4 YEARS (STANDARD 330 LB.).				
Trevor Hill Una 2nd	Sullivan Bros., Pittsworth	11,980·79	503·476	Rosenthal Musketeer
Fairvale Minerva	W. Henschell, Yarranlea	11,825·84	498·032	Fairvale Czar
Fairvale Ethel 6th	W. Henschell, Yarranlea	10,428·39	468·227	Corunna Supreme
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
College Kitty 6th	Queensland Agricultural High School and College, Lawes	6,959·55	338·909	Dulcimah Disraeli
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Elroa Princess 6th	P. R. Emery, Dallarnil	7,761·	329·598	Dnalwon Sceptre
Valera Bonny 7th	Sullivan Bros., Pittsworth	7,898·91	306·391	Valera Daphne's Prince
JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Alfa Vale Laura 6th (365 days)	W. H. Thompson, Nanango	16,528·05	731·761	Penrhos Pansy's Pride
Alfa Vale Lovely 17th (365 days)	W. H. Thompson, Nanango	15,135·2	560·125	Penrhos Pansy's Pride
Jamberoo Daisy 6th	A. H. Webster, Helidon	6,977·5	303·158	Murray's Bridge Florrie's Prince
Penrhos Maggie 13th	A. H. Webster, Helidon	6,465·65	289·529	Penrhos Pansy's Prince
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Trevor Hill Primrose 6th	G. Gwynne, Umbiram	7,775·65	326·618	Alfa Vale Reflex
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Alfa Vale Queenie (365 days)	W. H. Thompson, Nanango	10,293·25	421·882	Reward of Fairfield
Jamberoo Reddie 11th	W. Henschell, Yarranlea	7,591·5	334·741	Murray's Bridge Florrie's Prince
Ardilea Nellie 4th	W. Hinrichsen, Clifton	7,575·	312·052	Newstead Reliance
Navillus Daphney 5th	Dr. A. D. McKenzie, Kalmkillenbun	7,227·5	260·383	Greyleigh Eros
Sunbridge Lady Myrtle	A. Bradford, Yangan	5,951·7	249·729	Sunbridge Umpire

JERSEY.

MATURE COW (STANDARD 350 LB.).

Glengariffe Cunning Flora	J. J. Ahern, Conondale	7,290·7	412·249	Glengariffe Cunning Fenian
The Meadows Golden Columbine (251 days)	A. L. Semgreen, Coolabunia	7,884·55	404·342	Woodside Golden Count
Ashview Eva	C. Huey, Sabine	6,893·15	384·87	Trecarne Butter Queen's Officer

JUNIOR, 4 YEARS (STANDARD 310 LB.).

Westbrook Tulip 115th	Farm Home for Boys, Westbrook	9,839·1	477·995	Orphanage Count
Brookland Cunning Drop	W. S. Conochie, Sherwood	8,770·	427·53	Englorie Cunning Victor

SENIOR, 3 YEARS (STANDARD 290 LB.).

Lawn View Hopeful	W. A. Berderow, Fairney View	7,401·69	412·512	Oxford Buttercup Peer
Woodview Joybell	P. H. Schull, Oakey	5,962·15	314·823	Lermont Victory

JUNIOR, 3 YEARS (STANDARD 270 LB.).

Westbrook Tulip 122nd	E. Harmer, Beaudesert	8,441·3	393·289	Selsey Royal Standard
Navua Elfa's Victorine	C. A. Edwards, Alderley	7,918·21	370·721	Navua Victores Ruler
Boree Cute Lily	W. and C. E. Tudor, Branch Creek	5,657·04	318·939	Trinity Cute Commodore

SENIOR, 2 YEARS (STANDARD 250 LB.).

Oxford Marionette	Burton Bros., Wanora	7,450·	422·14	Oxford Brulad
Rosalie Midget	G. V. Tilley, Beaudesert	6,293·85	307·665	Rosalie Repulses's Dreamer
Oxford Jill	Burton Bros., Wanora	6,940·04	293·612	Oxford Ajax

JUNIOR, 2 YEARS (STANDARD 230 LB.).

Romsey Duchess 2nd	J. Wilton, Killarney	6,315·9	332·975	Oxford Pixie's Victor
Peeramon Pretty Bloom	N. Harris, Ravenshoe	6,708·8	332·394	Trinity Popcorn 2nd's Pioneer
Glenrandle Butter Queen	P. Kerlin, Killarney	5,428·1	299·422	Bellgarth Stylish
Lermont Madeira 2nd	G. Tilley, Beaudesert	6,122 15	289·252	Selsey Samare's Hallmark
Glenrandle Goldenette	P. Kerlin, Killarney	5.267·3	285·013	Bellgarth Stylish
Navua April Dawn	C. A. Edwards, Alderley	5.565 3	274·963	Dreamer's Hampton Star
Glenrandle Leda	P. Kerlin, Killarney	7,679·25	260 135	Bellgarth Stylish
Peeramon May	N. Harris, Ravenshoe	4,570·35	259·01	Trinity Segunda's Prince
Woodview Safety	P. H. Schull, Oakey	4,372·15	252·354	Lermont Commander

AYRSHIRE.

MATURE COW (STANDARD 350 LB.).

Crescent Farm June	N. J. Mann, Broxburn	10,522·94	426·419	Crescent Farm Pride's Colin

SENIOR, 3 YEARS (STANDARD 290 LB.).

Crescent Farm Isobel 3rd	N. J. Mann, Broxburn	9,081·9	367·618	Myola Orphan Boy

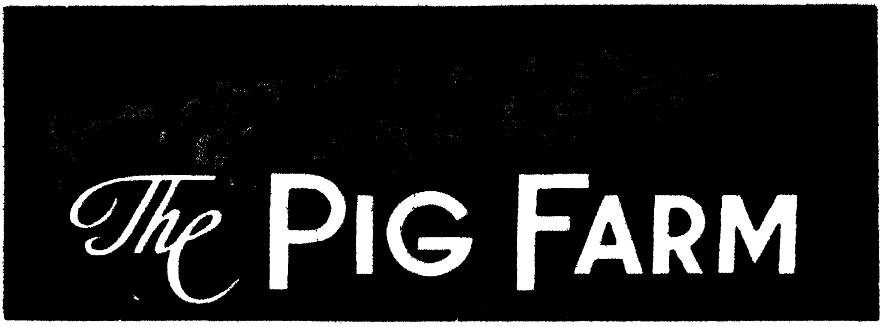
JUNIOR, 2 YEARS (STANDARD 230 LB.).

Leafmore Sophie's Gem	J. P. Ruhle, Motley	5,845·45	237·994	Leafmore Grischa

GUERNSEY.

JUNIOR, 2 YEARS (STANDARD 230 LB.).

Laureldale Polly	W. A. K. Cooke, Witta	6,012·5	301·474	Minnamurra Topsy's Sequel



The PIG FARM

Identification of Pigs.

Contributed by the Pig Branch.

IN Queensland, the law compels the proper identification of all pigs offered for sale or for disposal in any other way; therefore every person interested in the sale or purchase of pigs should be conversant with the various systems of identification of pigs. In the *Regulations* under the *Pig Industry Act* of 1933 it is set out clearly that every pig offered for sale, barter or exchange shall be branded by the vendor with a body tattoo marking, or other approved method of branding. In the case of suckers, weaners, stores, or other pigs not intended for immediate slaughter, ear-tattooing, or ear-marking is an approved method of branding; but such branding must be done within seven days prior to the disposal of pigs by sale or otherwise.

MARKING SYSTEMS.

Among systems of identification of pigs in regular use in Queensland are:—

- Firebranding;
- Body-tattooing;
- Earmarking (inclusive of use of ear tags) and ear buttons;
- Ear-tattooing;
- Paint and hair-clip marking (including cutting of hair on tail—i.e., bang-tail).

Firebranding.

For marking live pigs, firebranding has been in use throughout the world for many years and is used frequently by farmers here, especially by those who are not conversant with or in favour of other systems.

While there are many objections to identifying pigs by the use of a redhot iron brand, the system has its place and doubtless will continue to be used. Efficient firebranding has the advantage that it is a method of marking live animals as well as carcasses. In itself this method is effective if carefully applied with a suitable brand which is not overheated, or held too long, or pressed too deeply on the pig, as it results in a clear and legible skin and body mark. It is the abuse of firebranding which brings it into discredit, and it is often abused, as many otherwise suitable carcasses have to be degraded or rejected because of excessive and cruel firebrandng.

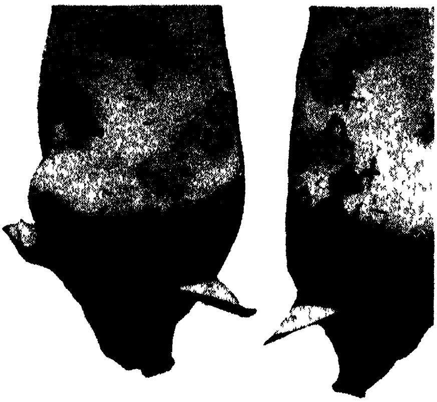


Plate 48.

A CLOSE UP OF BACON PIG CARCASSES BRANDED IMPROPERLY AND MUCH REDUCED IN VALUE.—The use of a firebrand, an instrument which may be used in the identification of carcasses if properly heated and handled, may easily be nullified unless the work is carefully performed.

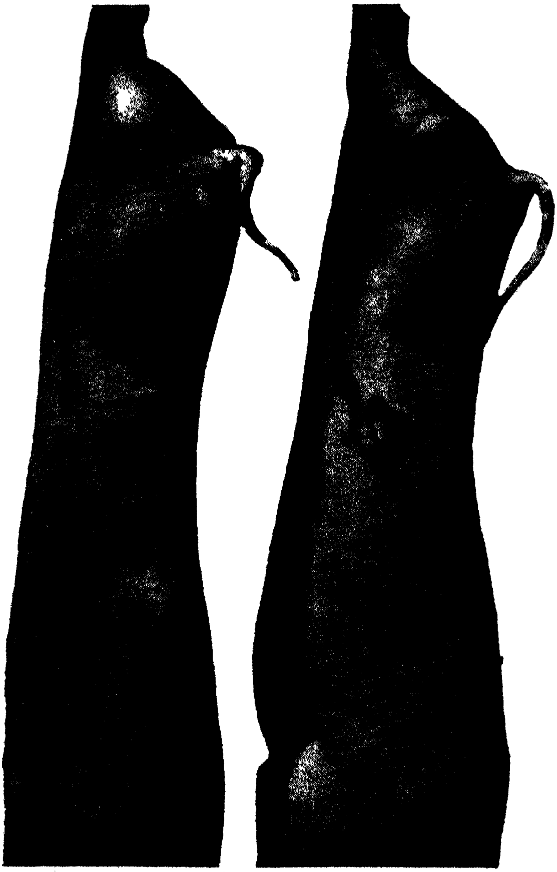


Plate 49.

It is an offence under the *Queensland Pig Industry Act* to illtreat a pig. Here is one result of excessive firebranding; also these brands have been placed in a most unsuitable position and are unnecessarily large.

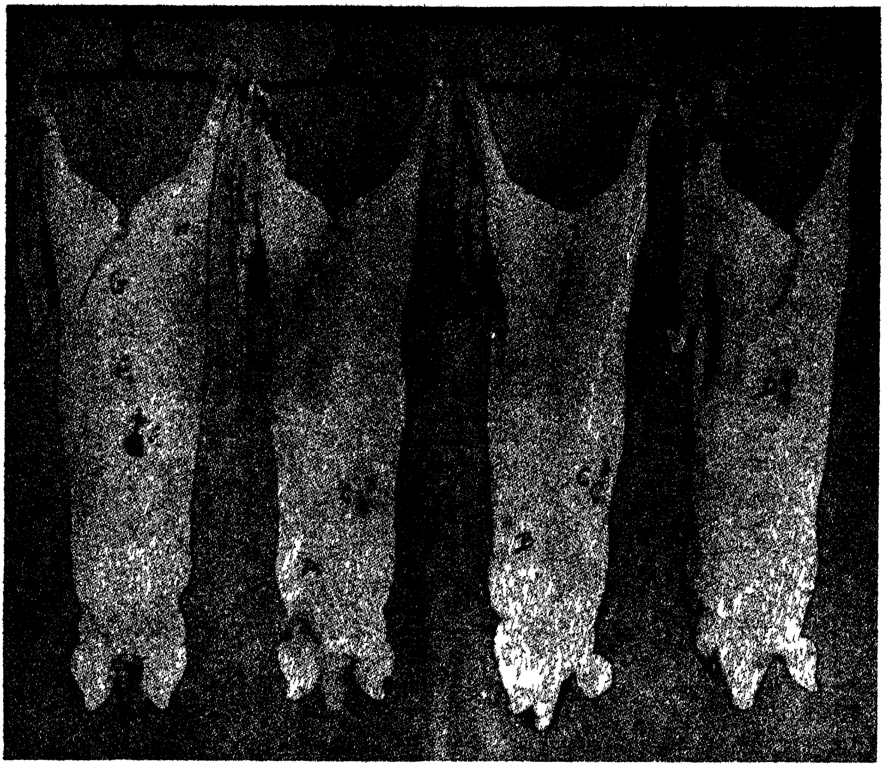


Plate 50.

AS IT IS IMPRACTICABLE TO ILLUSTRATE THE USE OF THE FIREBRAND ON A LIVE PIG THIS ILLUSTRATION IS USED TO INFORM FARMERS OF THE RELATIVE MERITS OF DIFFERENT POSITIONS FOR THE BRAND.—"A" is the position preferred by bacon curers, and is referred to as "off the top of the shoulder yet not too far down side." "B" also is a good position for firebrands or tattoo; there is a risk in this position, for if the animal moves quickly during branding the brand may slip and blur. "C" is not a good position, its situation along the centre line of the back results in the disfigurement of the mark in the process of dressing the carcass. "D" is decidedly objectionable. "E" is even more objectionable. The positions marked "G" and "H," or any other position on the loins or hindquarters, are also most objectionable and result in the carcass being degraded. Where pigs have a heavy coat of hair, it would be preferable and much more effective to clip the hair off the spot before applying the firebrand.

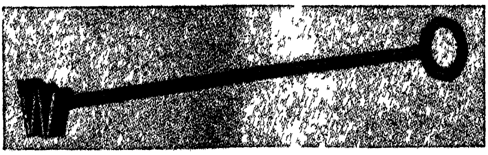


Plate 51.

FIREBRANDING OF PIGS, UNLESS DONE VERY CAREFULLY, IS AN OBJECTIONABLE METHOD OF IDENTIFICATION.—Where the firebrand used is of a suitable pattern its use in the identification of live pigs submitted for sale or on mature animals intended for slaughter after sale is permissible. This type of firebrand, manufactured especially for the purpose, is the only type recommended: it leaves a small, neat, and distinct mark if properly applied.

Suitable copper firebrands last longer than iron brands, although somewhat more expensive. The price varies according to design of letters or symbols. Only brands made specially for marking pigs should be used and of a size not exceeding 1¾ in. by 1¼ in. overall.

Firebranding has one special advantage in that it is used to identify live pigs belonging to various owners of mixed consignments to saleyards and bacon factories, consignments in which the body-tattooing of carcasses would not be sufficient. In some instances, however, earmarking of such pigs could be used to advantage and with less objection than firebranding.

Where properly applied, firebrands on pigs will be legible for about two months, but afterwards they become difficult to decipher either on the live animal or on the carcass.

Body Tattoo-marking.

Tattooing is the best and most practical way of marking for the identification of pork and bacon pig carcasses. In recent years this method has been generally adopted by bacon curers and pork exporters in Queensland. Correct identification of carcasses is, of course, necessary in the treatment of pigs by factories, especially where payment is made on a basis of official grading. Moreover, it is necessary to identify owners of pig carcasses in order that refunds or non-payments may be correctly adjusted where, on slaughter, carcasses or parts are condemned as unfit for human consumption. Body-tattooing is particularly valuable in thus identifying ownership, and also in providing necessary information in tracing disease to the place where it originated.

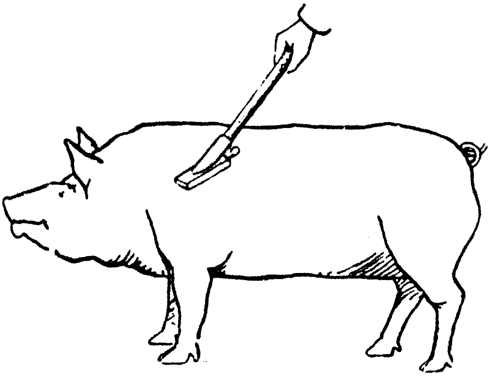


Plate 52.

THE PIG-BODY TATTOO SHOWING POSITION FAVOURED FOR THE IDENTIFICATION MARK ON THE CARCASS.—This instrument is supplied by manufacturers complete with nickel-plated headpiece and wooden handle. The numerals are mounted in polished aluminium blocks, the positions being altered in a few seconds by means of an adjusting screw. Spare numerals and dummy blocks may be ordered; tattoo ink or paste is supplied in quantities as required. If carefully handled, the one set of letters and numerals should be satisfactory for many years.

This method of identification has been thoroughly tested and has given general satisfaction, but the measure of efficiency is entirely dependent on the care used in handling the instrument and the provision of enough suitable ink or paste. The quality of the paste or ink used is very important. Of several preparations which have been subjected to experiment in Queensland, four stand out as being superior to all others. They are:—

> Indian marking ink (blue or black).—This pigment, while more expensive than the others, is probably the most efficient and adaptable, and in actual use is very easily applied.
>
> "Zebra" stove polish in paste form has given excellent results, as has liquid stove polish sold under the trade name of "Zebo."
>
> Sherwin-Williams' black paint in oil has been used extensively by the proprietary bacon factories with satisfactory results.

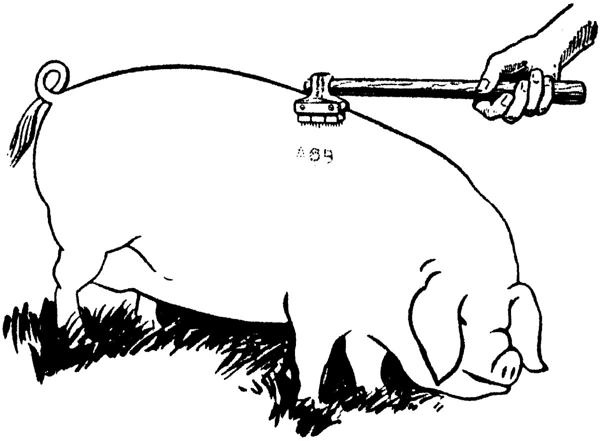


Plate 53.

THE "TWO-WAY TATTOO PIGMARKER," IS CONSTRUCTED TO WITHSTAND HARD AND CONSTANT USE.—The headpiece is made of aluminium with steel-pointed needles, the wooden handle being adjustable for use in two positions—one permitting use in hammer fashion, the other with spear-thrust action. The illustration portrays position for branding.

These preparations are readily procurable in country centres. If not obtainable locally, they may be obtained from city firms. It is necessary to have a soft pad and a container to hold the paste, paint, or ink. When all is ready, the tattoo needles are dipped in the paste or ink, the needles being well covered; the pig is then struck firmly with the marker (*see* Plates 52 and 53). The best position on the body for the tattoo mark is on the shoulder just off the top and slightly below top of neck. A sharp blow is required in order that the needles will penetrate the skin, and after each pig is marked the needles should be again covered with paste or ink. Actually, although the needles are sharp and the blow heavy, the pig does not feel much pain and apparently does not suffer injury, for it is very rarely that even a slight bruise is noticeable after slaughter if tattooing is done properly.

It is stressed again that this system of body-tattooing is not recommended as a means of identification of live pigs—not even of white-skinned pigs. Its value lies in the legibility of the tattoo mark on the carcass, the ease with which the tattoo mark may be read and the fact that its application does not result in disfiguration or other injury. It also is stressed again that the efficiency of tattooing as a means of identification depends on—

(1) The effective use of the tattooing instrument;
(2) The use of an instrument of a reliable type with strong, sharp needles;
(3) Taking time to do the job properly; and
(4) The use of a reliable brand of ink, paste, or paint.

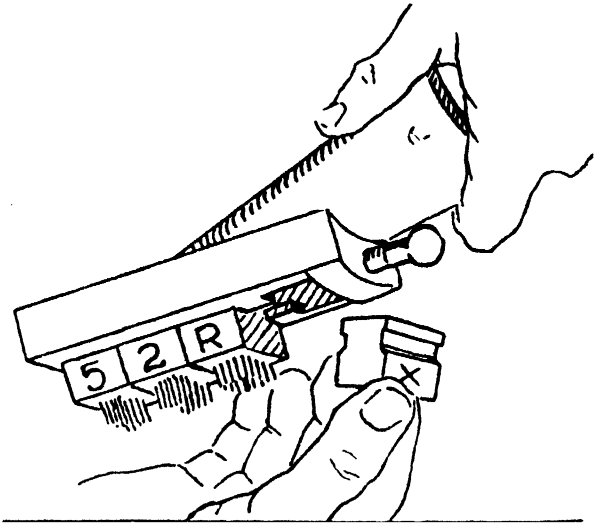


Plate 54.

ILLUSTRATES METHOD OF INSERTING NUMERALS OR LETTERS IN BODY-TATTOO INSTRUMENT; ALSO SHOWS METAL SCREW FOR ADJUSTING POSITION OF BLOCKS.

When Marking should be Done.

As the law places the responsibility of identification on the vendor, whether he be farmer, agent, dealer, or manufacturer's representative, it is essential that the pigs be identified before sale or delivery. Therefore, the pigs should be marked on the farm prior to despatch or be identified by the agent (1) when being weighed over the scales at the railway siding or loading-place, (2) when being penned for sale, or (3) when received for consignment direct to factories. The law also makes it compulsory for persons who handle pigs to keep proper records.

This is prescribed by the *Pig Industry Act* as follows:—

> Every agent, auctioneer, dealer, factory, or butcher shall keep a record in respect to every transaction in pigs with which he is concerned.
>
> Such record shall include the date, the number, description, and distinguishing marks of such pigs, the name and address of the vendor, and the name and address of the purchaser, and such other particulars as may be prescribed.

Such information shall be made available to an inspector upon request by the inspector to the auctioneer, agent, or dealer, as the case may be.

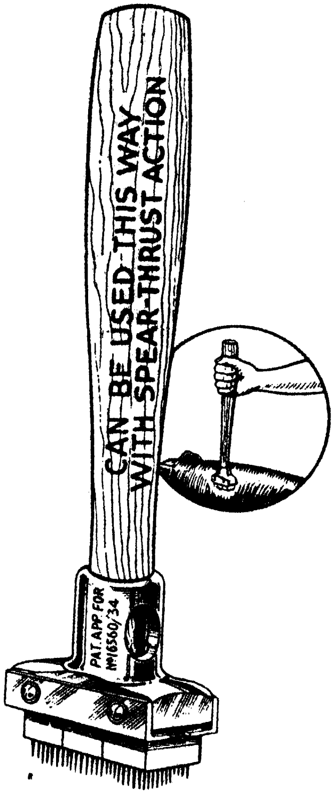


Plate 55.

SHOWING HANDLE OF "TWO-WAY TATTOO PIGMARKER" IN POSITION FOR USE WHERE PIGS ARE CRATED OR IN A POSITION UNSUITED FOR USE OF THE INSTRUMENT, AS ILLUSTRATED IN PLATES 52 AND 53.

Where Marks should be Placed.

In all systems of identification it is essential that while being marked pigs should be confined in a small pen or race, or that they should be marked in the vehicle—if such vehicle is convenient for the purpose—in which they are to be transported. Where there are no conveniences and the person identifying the pigs is inexperiencd, it should be practicable, in order to avoid duplication of tattoos, to attach a small pad soaked in ink or paste to that portion of the hammer head of instrument not fully occupied by letters or numerals, this merely to leave a paint mark on hair of the pigs as they are marked, for on black pigs in particular, the animal may be marked twice in the same position unless some such precaution is taken.

After pigs have been slaughtered and de-haired the tattoo letters or numerals show clearly in the form of black dots, such tattoo marks being legible even if the pigs had been tattooed several weeks beforehand. In the body-marking of pigs with tattoos there is no necessity for any preparatory treatment of area on which the tattoo is to be applied, except that the area should be clean and free from accumulations of mud. The instrument should be kept clean, and sufficient ink or paste should be used, otherwise the results will be unsatisfactory. Farmers not conversant with this method should attend at pig sales where tattooing is carried out. When visiting a bacon factory or meatworks, inquiry should be made from the management as to results of these several systems of identification.

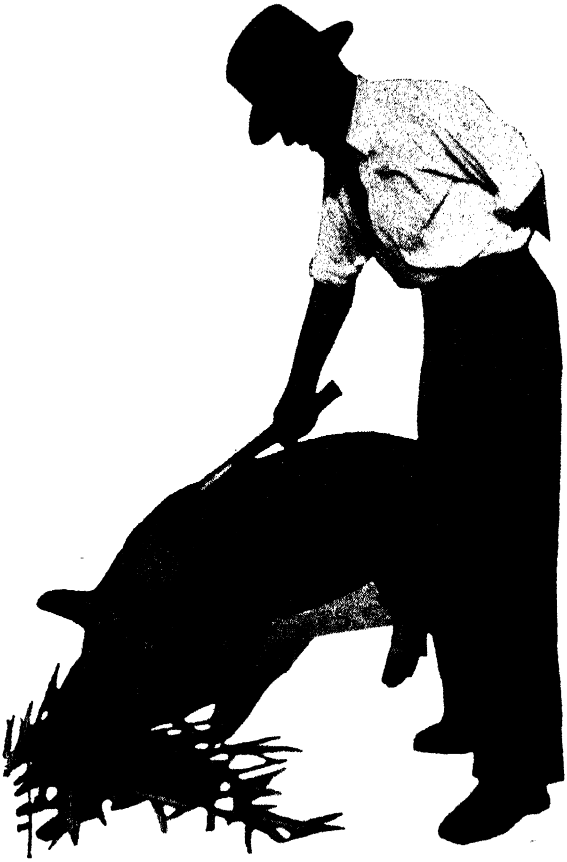


Plate 56.

SHOWING OPERATOR USING THE BODY-TATTOO INSTRUMENT; NOTE POSITION APPROVED FOR MARKING PIGS.

EARMARKING.

The branding or marking of individual pigs in a herd is of great importance to the farmer, more particularly where the animals graze and roam over large areas, or if there is a risk of their becoming "boxed" with a neighbouring herd.

No system of identification is perfect, but for the identification of live animals both earmarking and ear-tattooing are practical and readily applied. It is obviously very important that the brand or earmark be recorded in a suitable record book at the time that the marking is done, otherwise the reliability of any system is weakened.

The earliest age at which an identification mark becomes necessary in pig breeding is between one and two months. Where sows and litters have individual pens, two months is about the right age. Earmarking may also be done when the litter is weaned, or where the castration of male pigs is carried out at six weeks. Every litter should be marked and correct records kept in the sow's farrowing and stock sales record book. Earmarking is probably the commonest and the most satisfactory method of marking for stud stock, but it has the disadvantage that when pigs fight or tear their ears on wire fences, or where the ears are damaged in dehairing machines at the factory, this identification mark may be marred or destroyed. The operation of earmarking is performed with earmarking pliers, of which there are numerous designs.

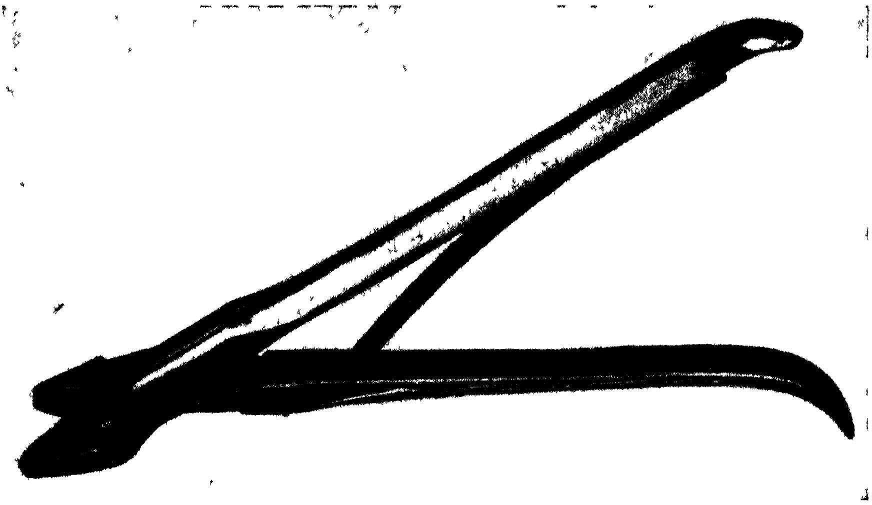


Plate 57.

TYPE OF EAR PLIERS USED IN THE EARMARKING OF PIGS.—These metal pliers, if carefully handled, last for many years.

Pigs of all ages may be earmarked but, as stated, it is preferable to mark while pigs are very young. Stud pigs should always be marked so that their breeding and ownership can be readily determined. Newly purchased pigs should be marked immediately they are brought into a stud, to avoid confusion if they should become mixed with other stock.

In Queensland, no provision is made for registration of pig brands or earmarks, but it is compulsory to identify animals before sale.

Stud pig breeders whose stock are registered in the Australian Stud Pig Herd Book should mark their animals as required by the rules of the Australian Stud Pig Breeders' Society. So long as the pigs are identified satisfactorily and are marked with an approved brand or mark, legal requirements would be satisfied.

Care should be taken in using ear pliers in marking pigs—first, to see that the pliers have been properly cleansed in a disinfectant solution; secondly, to see that the ear has similarly been cleansed, and also to avoid cutting into the larger blood-vessels near the edge of and towards the back of the ear. It is wise also to avoid cutting too close to the tip of the ear, especially in stud pigs, as the shape and carriage of the ears may be disfigured. In young pigs a small cut only is necessary.

A word of caution is necessary about earmarking pigs, for at times sows, especially, become savage and may tear the ears of other pigs—young pigs particularly. Such sows should be separated from the herd and be finished for slaughter, as they cause unnecessary loss, damage, and confusion. It is wise also to confer with the manager of the bacon factory or pork export works before deciding on an earmark for factory pigs, as there is a risk of duplication of marks. The factories would probably prefer body tattooing or firebranding instead of earmarking or ear tattooing.

When breeding sows are being marked, the mark should be recorded with the pedigree or record of purchase or birth. Additional particulars as to age, colour, any particular markings, or other details, should be recorded at the same time to assist in identification if necessary.

A Satisfactory System of Earmarking Pigs by Notches in the Ears.

For this system of ear marking unit numbers 1 to 9 are placed in right or off ear, and tens (10 to 90) in the left or near ear.

As the position of the notch on the ear determines its value, it is important that positions 1 and 10 and 4 and 40 be kept well towards the bottom and the tip of the ear respectively, to prevent confusion with the positions 2 and 20 in the middle of the ear.

KEY.

Right Ear—Units. Left Ear—Tens.

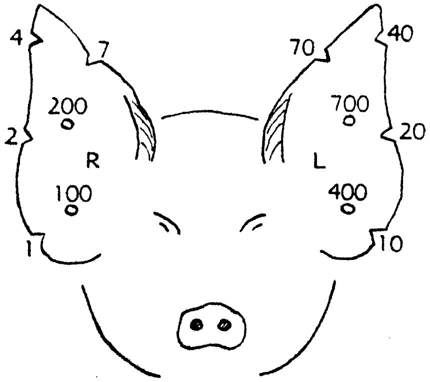


Plate 58.

THE KEY OR GUIDE OF EAR-MARKING SYSTEM.

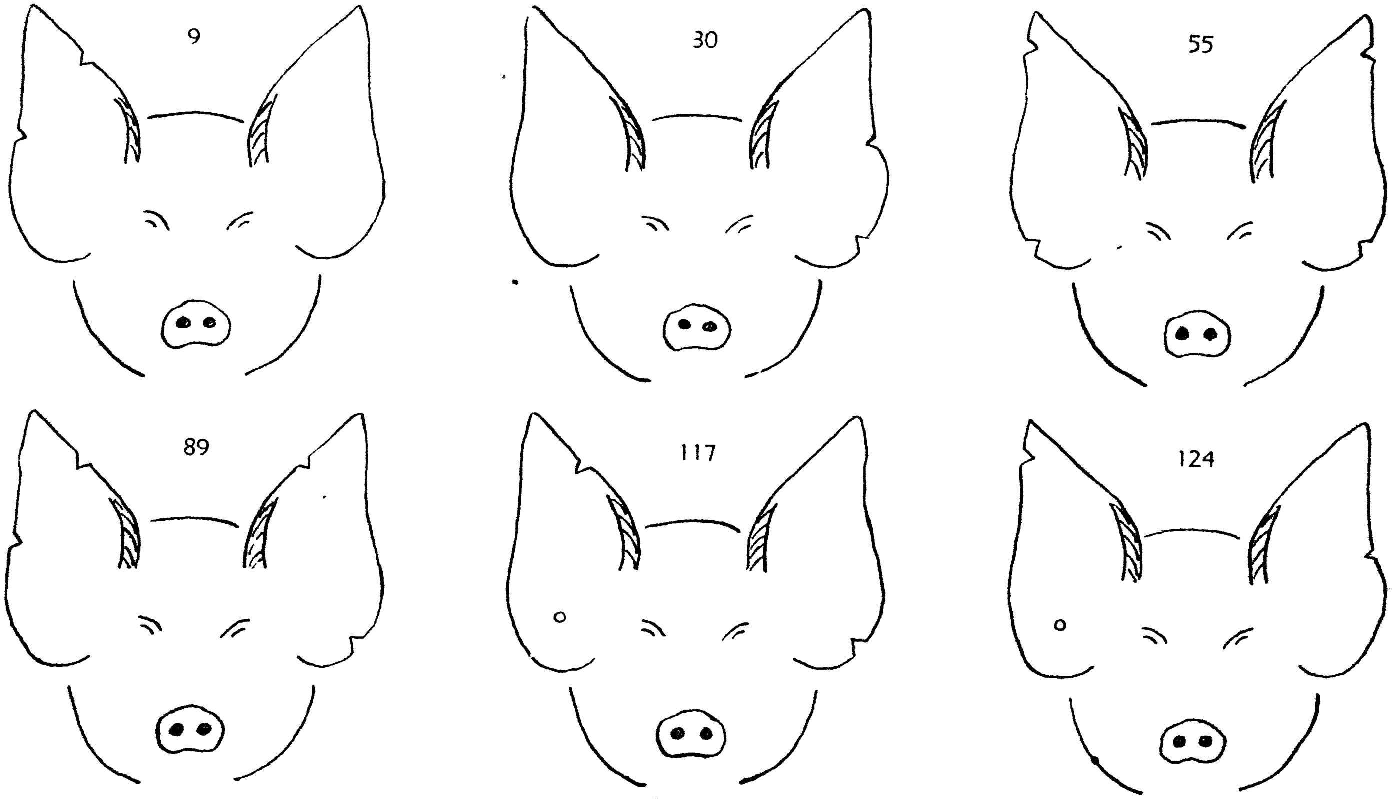


Plate 59.
ILLUSTRATIONS TAKEN AT RANDOM.

Ear-tattooing.

Members of the Australian Stud Pig Breeders' Society who breed Large or Middle White pigs are compelled by that organisation to use the ear tattoo for the identification of their stud pigs, this method having proved to be reasonably reliable for that purpose in white-skinned breeds. As with the body-tattooing, the secret of success lies in the careful application of the tattoo marks, and use of good quality ink or paste.

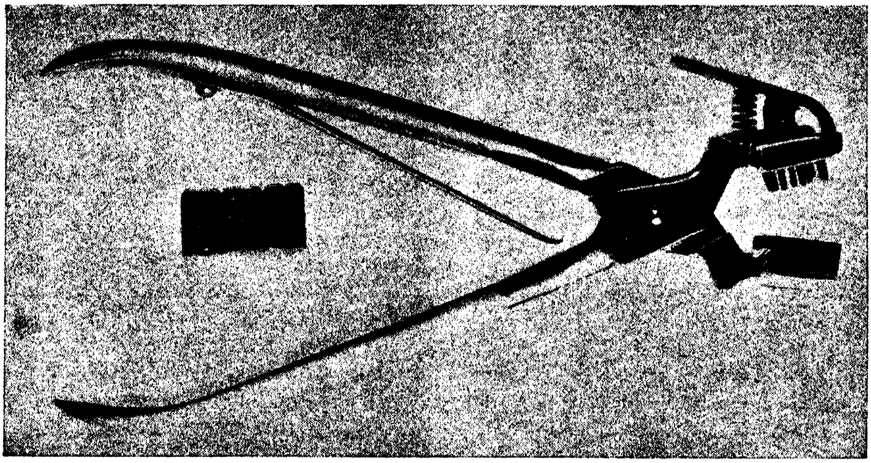


Plate 60.

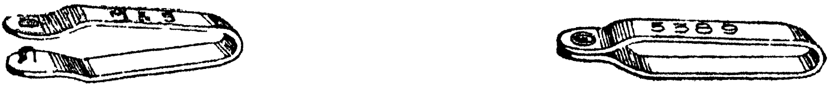
TYPE OF EAR-TATTOO INSTRUMENT HOLDING THREE INITIALS, ⅜-INCH, SUPPLIED WITH ONE SET OF NUMERALS.—It is recommended that initials should be used in one ear and numerals in the other. The smaller type needles are preferred in marking very young pigs, a larger type being more suitable for pigs over six months of age.

Tattooing has the advantage that it is practically indelible. Only the inefficiency of the person using the instrument, or the ears being torn or disfigured, can reduce this advantage. In the case of stud pigs, it may be necessary to re-tattoo the ears, as required, if the mark becomes too faint. Care should be taken in tattooing the ears to see that both the ear and the instrument are perfectly clean before the operation is performed, otherwise septic trouble may result and a fibrous wart growth set up around the mark. Next to cleanliness, it is important that the needle blocks be firmly placed in the jaw of the pliers, as the animal may pull back suddenly when pressure is applied. The area to be punctured should first be cleansed by wiping over with a cloth soaked in methylated spirits (this removes grease); then the marking ink or paste should be rubbed on, and, after piercing the ear with the tattoo instrument, the ink or paste should again be rubbed into the perforations made by the needles. If pigs are to be tattooed with the owner's initials as well as a stud number, one mark should be placed in each ear. The year in which the animal was born may also be placed in the form of a letter; thus in pigs the right ear may carry the owner's initials, and the left ear may show the year symbol and number, thus: A 365—i.e., pig born in 1946 number 365. In animals with a very heavy coat of hair on the ears, it may simplify the marking to first clip off the hair and then clean and apply the mark.

The necessity for quick and efficient work in tattooing and the use and application of reliable brands of ink or paste is stressed

Ear Tags or Buttons.

The use of ear tags or buttons on stud animals to be transported by road or rail or shipped from place to place is to avoid risk of their being lost in transit, misdelivered, or overcarried The tags, made of



Open Plate 61 Locked

METAL EAR TAG OPEN AND CLOSED

Advantages claimed for aluminium ear tags are.—

- Suitability for any class of stock, simplicity of design, ease of insertion, and durability
- Aluminium, being a non corrosive metal, will not rust, hence there is little risk of any infection of that portion of the ear into which they are inserted
- Space for both initials as well as numerals

Disadvantages are -

- Liability to be pulled or torn out when the animal fights or rubs against wire netting, and consequent unreliability as a permanent identification

Their special use is for identifying stud animals in transit or in research work for identifying different members of a group or litter

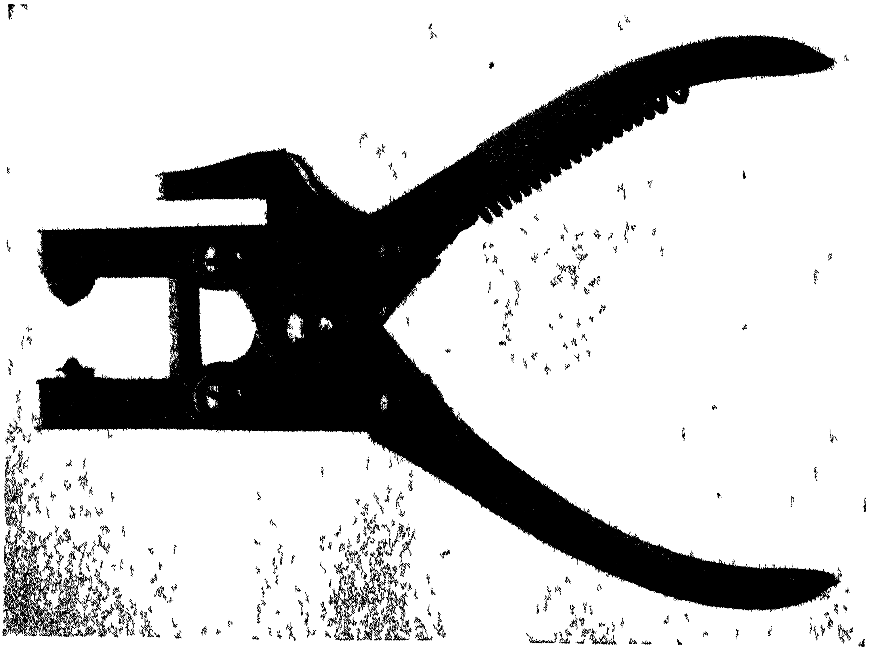


Plate 62

COMBINATION PLIERS —For piercing ear and sealing aluminium ear buttons or ribbon tags.

aluminium, may be initialled on one side with the name, initials, or symbol of owner, and numbered on the other. An objection to the use of ear tags is that they may be lost or, in the case of theft, replaced by another of the same type but with different lettering. All tags are subject to being pulled or torn out or to be crushed, mutilated, or disfigured to such an extent as to be unreliable as a means of identification. If not properly inserted, the ear tag may disfigure the ear, and may even cause a festering wound around the tag hole. This is especially the case if the hole into which the tag is inserted is too small or is jagged or if unclean pliers or unclean tags or buttons are used. The method of applying the ear tag by use of combination pliers is that one portion of the instrument is used to punch a hole in the ear into which the tag fits. The other portion of the pliers is to seal the tag.

Hair-clip Marking.

Marking pigs by clipping away the hair on any particular portion of the body is at best merely a temporary sale mark; so also is paint-marking and the cutting of hair on the tail (bang-tailing). Paint-marks are useful once pigs are penned in a saleyard in order to differentiate between the animals and for reference purposes, but they cannot be regarded as an approved method of branding under the *Pig Industry Act*. Both systems are useful in the hands of honest people, but a very strong objection to their use lies in the fact that an unscrupulous person could readily disfigure the mark and thus cause confusion and annoyance.

The aim is to ensure reliable methods of identification; hence as paint-marks, hair-clipping, and banging tails are unreliable as a permanent method of identification, they cannot be recommended. They are not legally acceptable under the *Pig Industry Act*, but if pigs are so marked at sale time the salesman should keep a strict record of them as provided for by law.

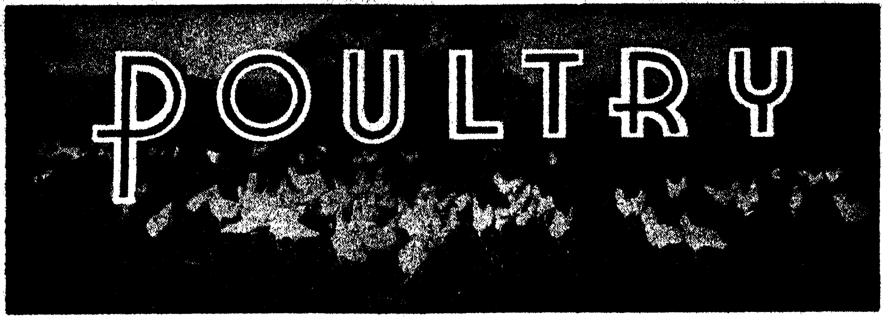
Conclusion.

Summarizing these notes it is emphasized that it would be advantageous to all concerned if all live pigs are branded by the vendor prior to the disposal of the animals. It is essential that whatever mark is used it should be used effectively, so that the animals are clearly and evenly branded. The next important thing to do is to advise the agent, dealer, buyer, or factory manager of the exact number, age, and condition of pigs, the marks given to each animal, and any other description which may be necessary to facilitate identification, and to ensure that the person concerned receives this information in ample time to enable identification to be observed and recorded expeditiously on delivery of the pigs at their destination.

TO SUBSCRIBERS.

Kindly renew your subscription without delay. Write your full name plainly, preferably in block letters.

Address your subscription to the Under Secretary, Department of Agriculture and Stock, Brisbane.



Incubation—Importance of Nutrition.

P. RUMBALL, Officer in Charge, Poultry Branch.

DURING the war period many enquiries were made by hatchery owners and others as to the cause of poor hatching. The experience of many during the 1945 hatching season was so serious that it was decided to make a survey of as many hatcheries as possible in the Brisbane area.

The survey extended over the operations of 38 hatcheries. Enquiries were directed along the following lines:—

(1) Percentage of chickens from all eggs set;

(2) The nutrition of the parent stock.

Temperatures and humidity were not taken into consideration, as all hatchery owners are experienced and had operated their plants successfully in previous years.

The survey indicated that in many instances where highly satisfactory hatches were being obtained from the eggs of the flock associated with a hatchery, the hatches from eggs that were being custom-hatched were exceptionally poor. Again, with hatcheries which were experiencing poor hatches from the eggs from the associated flock, particularly good results were being obtained from some eggs that were being custom-hatched.

The foregoing points very definitely to a weakness in the eggs of the parent stock. This could be due either to poor stock, or to stock not receiving a ration carrying the necessary nutrients for the production of eggs which, when fertile, will permit of the proper development of the embryo and hatching of a sound chicken.

In order to impress on poultry raisers the importance of correct nutrition, the following table has been prepared. In its preparation only the results from flocks associated with hatcheries have been taken into consideration:—

Average per cent. Hatch of all Eggs Set.	Classification of Hatching Results.	Number of Hatcheries.	Total Capacity of Hatcheries per 3 Weeks.	Value Chicks at £3 per 100.	Value of Chicks Lost as compared with Hatcheries Classed as Good.
				£	£
72	Good . .	17	188,400	4,068	. .
59	Medium . .	12	140,000	2,478	546
45	Poor . .	9	106,200	1,434	858

The table shows that in the medium group twelve hatcheries each lost chickens to the value of £45 per three weeks when compared with those classed as good, and the group classed as poor, £95 each per three weeks.

The nutrition of flocks varied in all cases and because of the difficulty in obtaining feeding material was not constant in any instance over a sufficiently long period to make any comparison. The prospect of having a plentiful supply of various types of feeding material this year is not bright; therefore the usual practice of feeding a wide variety of foodstuffs, which is a general safeguard against faulty nutrition, is not possible. Considerable research has been made in relation to poultry nutrition and advantage has to be taken of this work to assure that the rations supplied carry all the essential ingredients for good hatchability.

The effect of diet on the chemical composition, nutritive value and hatchability of the egg has been the subject of recent investigation. It was formerly considered that the composition of eggs was nearly constant, but it is now realized that one egg may differ from another in both physical and chemical properties. From the commercial standpoint, it has been shown that variations in such physical characteristics as strength of shell and ratio of thick to thin white will determine the transport and storage capacity of the egg.

The fact has long been recognised that satisfactory hatching cannot be obtained from eggs of birds whose only source of protein is of vegetable origin, but as meat meals are used to build up the protein levels of rations, and not protein-rich foods of vegetable origin, the shortage of proteins of animal origin should give no concern to the hatcheryman. Vitamins A, B1, D, E, and G, plus minerals, are of outstanding importance, and for satisfactory results must be fed in sufficient quantities. It has been established by investigators that, although it is possible to obtain good egg production with smaller quantities of vitamins than are recommended here, satisfactory hatching results would not be obtained from these lesser quantities.

Vitamins.

Vitamin A.—In recent years the vitamin A requirements of poultry have been extensively studied, and it is possible to state both the approximate minimum requirements and the approximate optimum level intake. The minimum requirements are about 700 international units per lb., and the optimum level is about 1,450. More than this can be fed without any harmful results, and when this can be done without increasing the cost of feeding it is recommended. Turkeys require from 2 to 2½ times as much as growing chickens, therefore the requirements of turkeys are 3,630 international units per lb. of feed, but one authority recommends feeding a ration containing 4,720 international units per lb. of feed for the production of eggs that will give a good hatchability.

Vitamin B1.—Research workers generally conclude that a deficiency of vitamin B1 will reduce hatchability, but as a rule enough of this vitamin is present in most diets fed to breeding stock. In ordinary practice, it has been found that when ground whole grains and grain offals are fed to breeding stock, eggs are probably supplied with enough of vitamin B1 to assure reasonable hatchability. The deficiency of this vitamin has been pronounced during recent years in the rations supplied to chickens and growing stock. This is doubtless due to a shortage of mill offals, and breeders who are preparing their own mashes should conserve as much offal as possible for baby chickens.

Vitamin D.—Vitamin D is essential to hatchability. This vitamin can be provided by allowing the birds direct access to sunlight, or supplying them with fish oils.

Vitamin D aids the assimilation and utilization of calcium and phosphorus, thereby improving the quality of the shell of eggs. It is essential to good hatchability. If fowls have sufficient exposure to sunlight, there is little likelihood of trouble developing from the lack of this vitamin as the ultra-violet rays of the sun penetrate the exposed layers of the skin, enabling the bird to manufacture enough vitamin D for ordinary requirements. Cloudy conditions make the supply of this vitamin uncertain, and in winter the ultra-violet rays from the sunshine are not as effective as in summer. If available, it is considered that breeders should be supplied with some supplementary source of this vitamin.

It is interesting to note that some investigators have found that, while 67 international units of vitamin D per 100 grams of food are sufficient for good egg production, 135 units of vitamin D per 100 grams are required for good hatchability. One authority, however, recommends 540 international units per lb. of feed.

Vitamin E.—Although vitamin E is essential for hatchability, and embryonic mortality in the first week might be attributed to its deficiency, there is no reliable data on the quantity of vitamin E necessary, and on the available evidence most poultry diets contain enough to support good hatchability. In the event of embryonic mortality during the early hatching period, wheat germ meal or mill offals would be the most fruitful source of supply.

Vitamin G (Riboflavin).—Many research workers have observed a direct relationship between the riboflavin content of the diet and that of the egg, and it has been established that the hatchability has a direct relationship to the amount of riboflavin within the egg. It has been ascertained that in a period of three weeks a ration in which the riboflavin content is decreased below the essential level, hatchability has decreased accordingly. Riboflavin deficiency in young chickens has been somewhat prevalent during recent years. It manifests itself by the chicken moving on its hocks with the toe turned inward—"curled toe."

The best sources of riboflavin are milk products, liver, and greenfood. Of this vitamin, 1,110 microgrammes per lb. are required to obtain satisfactory reproduction.

Minerals.

Calcium and Phosphoric Acid.—Although calcium carbonate is essential for the maintenance of hatchability, it has been found that too much calcium may adversely affect hatchability, and that there should be a correct ratio between the phosphate and calcium content. A satisfactory level of phosphorus intake is ·7 per cent., but many rations contain more than this, and one authority recommends that rations should contain not less than ·7 per cent. of phosphorus, and that the calcium content should be adjusted so that there is about 1·6 times as much calcium as phosphorus. (This figure is approximate if bone is the source of lime.)

Manganese.—The optimum quantity of manganese in a diet is about 50 parts per million. Many diets commonly fed do not contain this amount of manganese, and a deficiency should be guarded against. It is recommended as a safeguard against manganese deficiency that in all mash diets ½ per cent. of a mixture of 100 parts of salt and 1·7 parts of anhydrous manganous-sulphate or ½ per cent. of a mixture of 100 lb. salt and 2¼ lb. manganese sulphate tetrahydrate be included, but where a laying mash or a growing mash is fed in conjunction with grain, 1 per cent. of either mixture should be used. This mixture also supplies the salt requirements of poultry.

Comparison of Rations.

In the survey in the Brisbane area referred to, it was pointed out that enquiry was made as to the rations fed, but that they were not sufficiently constant to make any large scale comparison. It is, however, possible to compare one from the group classified "good" and one from the group classified as "poor."

A comparison of the rations, with respect to vitamin A and riboflavin only, discloses that without green feed both rations were deficient. One hatchery owner, however, had plenty and could make up the deficiency, but such was not the case with the hatchery owner who was getting poor results.

RATION WHICH GAVE GOOD HATCHES.

Ingredient.	Amount lb.	Units of Vitamin A.	Microgrammes of Riboflavin.
Pollard	28	3,360	25,200
Bran	10	1,500	10,000
Lucerne Chaff . .	5	65,000	25,000
Meat Meal	4½	. .	12,150
Krafco	2½	?	?
Linseed	2	400	1,800
Maize (Yellow) . .	24	76,320	10,800
Wheat	24	3,360	9,600
Totals	100	149,940	94,550
Total per lb. . .	. .	1,499	945
Short of optimum level per lb.	. .	3,221	165

The deficiency could be overcome in the case of vitamin A by feeding 1 ounce of lucerne per 4 birds, but in the case of riboflavin, 1½ ounces per 4 birds would be necessary.

The farmer who was using this ration had a very good supply of Chinese cabbage—a good source of vitamin A and riboflavin.

RATION WHICH GAVE POOR RESULTS.

Ingredient.	Amount lb.	Units of Vitamin A.	Microgrammes of Riboflavin.
Bran	9	1,350	9,000
Pollard	6	720	5,400
Wheat Meal	14	1,960	5,600
Maize	14	44,520	6,300
Meat Meal	4	. .	10,800
Linseed	1	200	900
Lucerne Chaff . .	4	52,000	20,000
Wheat	48	6,720	19,200
Totals	100	107,470	77,200
Total per lb. . .	. .	1,074	772
Short of optimum level per lb.	. .	3,646	356

This farmer had no green feed supply. The richest source of vitamin A and riboflavin in his ration was lucerne chaff, although it should be remembered that lucerne chaff loses some of its vitamin A content with age. To make up the deficiency with this material he would have had to supply a little more than 1 ounce of lucerne chaff per bird to bring vitamin A up to the desired level, whereas it would have only taken a little more than ¼ of an ounce to lift the riboflavin to that level.

The supply of a sufficient quantity of lucerne chaff to bring the vitamin A content up to the optimum level would increase the fibre content beyond the capacity of the bird.

In the absence of green feed the most economic method of increasing the vitamin A content of the above ration was to have used a fish oil. A small percentage of liver meal would have corrected the riboflavin deficiency.

Vitamin and Mineral Tables.

From the following tables it will be possible for poultry raisers to examine the ration fed and correct any apparent weaknesses.

AVERAGE VITAMIN CONTENT OF SOME FEEDSTUFFS.

Kind.	Vitamin A. per lb. Inter. Unit.	Vitamin B1. per lb. Inter. Unit.	Vitamin D. per lb. A.O.A.C.	Vitamin E.	Vitamin G. (Riboflavin) Microgrammes per lb.
Barley.. ..	400	250	Trace ..	XX	400
Maize (Yellow)	3,180	270	†	XX	450
Maize (White)	0	270	†	XX	450
Cow Peas ..	1,360	450	†	*	350
Milo	250	*	†	*	400
Oats	80	270	†	XX	400
Peanut Meal ..	250	900	†	XX	1,200
Wheat.. ..	140	340	†	XX	400
Wheat Bran ..	150	450	†	XX	1,000
Wheat Germ Meal ..	1,900	1,930	†	XXXX	1,800
Wheat Middlings near Pollard ..	120	1,000	†	XXX	900
Cottonseed Meal	600	1,800	†	*	300
Linseed Meal	200	2,000	†	X	900
Buttermilk, Dried ..	200	400	Trace ..	X	9,000
Cod Liver Oil..	340,190	0	45,360	0	0
Liver Meal ..	*	*	*	*	18,500
Meat Scrap ..	*	*	†	*	2,700
Skim Milk (Liquid) ..	15	40	†	X	1,000
Green Lucerne	63,560	225	†	XX	2,000
Lucerne Meal..	13,000	400	†	XXX	5,000
Lucerne Leaf-meal ..	32,000	400	14	XXX	7,000
Cabbage ..	200	100	†	*	100
Molasses ..	*	*	†	*	2,000
Kale	181,400	100	†	*	2,240

* Information on vitamin content is lacking.

† means that the feedstuff contains no appreciable quantity of Vit. D. Vitamin E. — Fair source of Vitamin E.; XX Good source; XXX Very good source; XXXX. Excellent source.

Extracted from the United States Department of Agriculture Year Book, 1939.

AVERAGE MINERAL CONTENT OF SOME FEEDSTUFFS.

Kind.	Calcium.	Phosphorus.	Manganese.
	Per cent.	Per cent.	Per Million.
Barley	·05	·36	16
Maize (Yellow)	·01	·29	5
Maize (White)	..	..	..
Cow Peas	·10	·46	30
Milo	·04	·32	15
Oats	·10	·44	20
Peanut Meal	·18	·56	Information Lacking
Wheat	·04	·39	39
Wheat Bran	·11	1·21	119
Wheat Germ Meal	·07	1·01	160
Wheat Middlings	·08	·93	119
Cottonseed Meal	·23	1·18	18
Linseed Meal	·33	·74	40
Buttermilk, Dried	1·56	1·05	·4
Cod Liver Oil	.	..	..
Liver Meal	·11	·90	4
Meat Scrap	8·25	4·00	18
Skim Milk Liquid	·13	·11	Trace
Green Lucerne	·42	·07	7
Lucerne Meal	1·44	·21	26
Lucerne Leaf Meal	1·90	·22	30
Cabbage	·07	·04	21
Molasses	·56	·06	Information lacking
Kale	·18	·07	ditto

Extracted from the United States Department of Agriculture Year Book, 1939.

Preparation of Silage.

Provision of green feed is one of the difficulties Queensland poultry raisers have to face. Silage is a good source of vitamin A and riboflavin, and it could be used by poultry raisers more extensively.

As silage for poultry should be made from young growths which are rich in protein, molasses is added. The material to be used should be cut while still fresh and succulent into lengths of about half an inch. If concrete silos are unavailable, barrels or drums of a capacity of about 40 gallons may be used. Immediately after cutting, the material should be packed tightly into the silo, which should be filled to the top. To each 40-gallon drum of material, 2 gallons of molasses thinned with water (usually about 2 gallons) are poured over the top. The quantity of water is largely governed by the wilting which has occurred before chaffing. A weight of about 150 lb. to 200 lb. should be applied to the top of the silage, and it should then be left to stand for some time.

Considerable settling down will occur, permitting of more material being added the next day after which the weight should be again applied. After a little more settling down of the material, the silo should be sealed. This is one of the most important points in the manufacture of silage. The most satisfactory procedure is to cover the silage with tarred paper or other waterproofed covering and place over it puddled clay to a depth of 2 to 3 inches. This should be inspected after about two days and again at later intervals. Any cracks which appear on its surface or between the drum and the clay should be plastered with more clay. With properly sealed silage, the material used retains its colour, the juices are conserved and the development of moulds and insect larvae, which would make the use of the silage dangerous, is checked.

Method of Feeding.—Although they usually take to it readily, poultry may have to be accustomed to silage. The best method of introducing it to their ration is to mix it with the mash. Once they have become accustomed to it, silage may be fed as a green feed. It will be freely consumed, but 4 to 5 lb. per 100 birds will be found sufficient.

◆

BARLEY AS A FOOD FOR FOWLS.

The nutritive value of barley is a little less than that of wheat. As a grain for feeding to fowls however, it has never been used much in Queensland, and nowhere else in Australia really, excepting probably, South Australia. Fowls do not take kindly to barley grain, for some reason or other. Perhaps its lack of palatability may be the explanation; but then, poultry never take kindly to any change in diet, that is why poultry farmers accustom their flocks gradually to any change from one type of grain to another, or from one system of feeding to another.

The cheapest grain available today is barley. As wheat cannot be got at the present time as fowl feed, for love or money, it is no good talking about a gradual change to barley for fowls which have been getting wheat. Therefore, to get fowls to pick up barley instead of their customary wheat or other grain ration, something has to be done to make the barley palatable to poultry. It has been found that, within a day or so after a change of grain, fowls will eat barley freely if the grain has been soaked for about 24 hours previously. It is not good practice, however, to scatter the soaked barley among the litter in the yard; it should be given to the fowls in troughs or dishes.

Although on analysis the nutritive value of barley is little less than that of wheat, for practical purposes, barley is just as good as wheat in food value if it is fed as a constituent of a scratch grain. Another finding by experiment is that barley may be substituted for yellow maize in a ration with plenty of lucerne meal, which makes up for any deficiency in the food value of yellow maize. That also applies to wheat, if it is used instead of yellow maize.

This season, poultry farmers have been using wheat almost exclusively although, as is well known, the feeding of one type of grain only is not the best fowl feeding practice. Now that the necessity of changing over has arisen it is suggested that, with barley, some maize should be used (if it is available of course), but unless maize makes up one-third of the whole ration with barley the fowls should be given plenty of green feed or a green feed substitute as green feed is essential to both the health and production of the poultry flock.,

THE COUNTRYMAN'S SESSION

Sunday Morning Radio Service to Farmers

(By arrangement with the Australian Broadcasting Commission)

Farmers are recommended to tune in to either a
Queensland National or Regional Station.

EVERY SUNDAY AT 9.30 a.m.

Agricultural Chemistry

Feeding Oat Grain.

Supplied by the Biochemistry Section.

OAT grain has come on the Queensland market again, and in response to numerous requests some information on its use as a livestock food is given here.

Horses.

Of all horse feeds, oat grain is the best known. With many owners it is a fetish that no horse feed is complete without oats; yet the Arab horse, famed for stamina and spirit, rarely gets oats.

Numerous horse rations equal to or better than oat rations can be devised, frequently at a considerable saving. But they almost invariably involve more than two forms of concentrate, while chaff and oat grain is quite satisfactory without having any particular regard to quantities.

There is no need to crush oats, unless for foals and older animals with broken or worn teeth. Soaking is equally unnecessary.

The amount to be fed depends largely on how hard the horses have to work. It may be necessary for draughts at very heavy work to have over half their total intake as grain. Under such a high standard, it is preferable to use some other grain mixed with the oats. Corn and oats go well together. Corn supplies nearly half as much energy again as oats and consequently any substitution should be at the rate of 7 lb. of oats by 5 lb. of corn.

Pigs.

Oats contain more fibre than any of the other common cereals; consequently its use for growing pigs should be restricted. Milled or crushed oats may represent about one-quarter of the grain allowance for young pigs.

Old sows, until at least half way through the gestation period, have been shown to do well on equal parts of lucerne and oat grain, but this level is usually uneconomical in Queensland, which imports so much of its oat grain requirements.

Sheep.

Apart from stud animals, and in times of drought, handfeeding of concentrates to sheep is not practised in Queensland.

Oat grain is an excellent food in preparing animals for show or for supplementary feeding of top breeders. There is no need to grind or crush the grain.

Goats.

Milch goats capable of giving a quart or more may be kept in production over an extended period by allowing from ½ to 1 lb. of grain at the evening milking.

Calves.

Ground oats are well liked by calves. It is best to include other cereals and a little linseed for calves which are being weaned from separated milk. Two parts each of oats and maize meals, with 1 part linseed meal, is an excellent weaning mixture.

Dairy Cattle.

The grain-bran meal so commonly used among farmers providing milk for sale may safely be replaced by ground oats. Cattle take to this feed well and the risk of "going stale", which is commonly experienced with other small grains when not supplemented with bran, is avoided.

Beef Cattle.

The use of oats for stall-fed beef cattle is too well established to call for comment. There is a rather common tendency to keep the bran level high as the oat allowance is increased. This "loosens" the animal unnecessarily and results in loss of food through its non-digestion. It is better to crush the grain and reduce the bran as the oats is increased, until on full feed the bran is omitted.

Plate 63.

THE EDINGTON WATER HOLE, NEAR GILLIATT, N.W. QUEENSLAND.

GENERAL NOTES

Staff Changes and Appointments.

Mr. C. J. F. Swinburne, Senior Adviser in Sheep and Wool, has been transferred from Blackall to Dalby.

Mr. G. R. Morrison, Senior Adviser in Sheep and Wool, will take up duty at Barcaldine in the near future, and Messrs. H. C. Hall and J. H. Campbell, Advisers, will be stationed at St. George and Hughenden, respectively.

Lieut. A. F. Gurnett-Smith, B.Agr.Sc., at present with the 13th Australian Malaria Control Unit, A.I.F., has been appointed Assistant Bacteriologist in the Department of Agriculture and Stock, and will be stationed at the Animal Health Station, Yeerongpilly.

Mr. G. C. Simmons, B.Sc., Adelaide, has been appointed Assistant to Bacteriologist at the Animal Health Station, Yeerongpilly.

Mr. J. D. Lawson, recently appointed Dairy Officer, has been assigned to the Ipswich and Lowood districts, with headquarters at Ipswich.

Oats as Pig Food.

With the prospects of a record oat crop in Queensland, pig farmers should give consideration to the inclusion of this grain, if necessary, in the pig's rations. However, the price factor must be taken into account and with wheat at 4s. 6d. per bushel, oats would be good buying if not more than 2s. 6d. per bushel.

Because of the large percentage of husk, oats are not as a rule recommended as a food for pigs and are unsuitable as the only grain, also the price is usually too high.

However, up to 50 per cent. of the grain ration may be replaced with oats, without affecting the growth of the pigs and provided it is finely ground may be fed to pigs of all ages. Brood sows and boars are able to handle a bulkier ration than growing stock, therefore up to two-thirds of their grain ration may be made up with ground oats.

As with wheat and maize, mixtures containing oats and other grains must be supplemented with some protein-rich food, such as meat meal, if satisfactory results are to be obtained.

Wheat Stabilization.

The State Wheat Board discussed with the Minister for Agriculture and Stock (Hon. T. L. Williams) recently the proposed Commonwealth plan for post-war wheat stabilization. The Board expressed its viewpoint that any scheme of Commonwealth wheat stabilization should be so devised as to provide that the Queensland wheat marketing scheme under the *Wheat Pool Acts* should be fitted intact into the wider scheme, and the powers and functions of the State Wheat Board should not be impaired.

The Minister added that the wheat growing areas of Queensland are only in process of development and obviously any stabilization scheme to be acceptable to this State would need to be one which would permit of wheat taking its place in the normal development of these areas, at least up to a point whereby the State's domestic needs would be provided.

The Queensland scheme, which was temporarily superseded during the war years by the Commonwealth stabilization plan established under the *National Security Act*, has worked with great success for a quarter of a century, and the Board feels that its continuance is warranted, particularly as any post-war wheat stabilization scheme must be based partly on State legislation. The Board also is competent to administer any production control measures which may be an integral part in any stabilization scheme which may be acceptable to all of the Governments concerned.

Rural Topics

Bureau of Sugar Experiment Stations.

From the *Annual Report of the Bureau of Sugar Experiment Stations*:—

The staffing of the Bureau has undergone material adjustment during the period under review. Dr. H. W. Kerr, who had been engaged in wartime work in connection with processed food standards since January, 1943, tendered his resignation in April. His association with the industry since 1924 has been a continuous record of meritorious service, and it is greatly to be regretted that his outstanding ability and experience have been lost to the sugar industry and to the State.

A comprehensive reorganisation of the Department of Agriculture was approved by Cabinet during the year, and is now being put into effect. The Bureau of Sugar Experiment Stations has been incorporated within the Division of Plant Industry, but remains under the direction of the Advisory Board as to policy. Mr. A. F. Bell has been appointed Assistant Under Secretary in addition to being Director of Sugar Experiment Stations, and will be assisted in administration by Mr. Behne, who becomes Assistant Director and Chief Mill Technologist, and Mr. R. W. Mungomery, who comes to head office as the officer in charge of the Division of Entomology and Pathology.

Mr. C. R. von Stieglitz (Chemist) has severed his association with the Bureau after 31 years' service, and has taken over the plant nutrition laboratory of the Department of Agriculture. New appointees are Mr. J. H. Nicklin (Engineer), who has had some years of experience at Pleystowe Mill, Mr. L. G. Vallance (Chemist), and Mr. W. J. S. Sloan (Agronomist).

Mr. J. L. Clayton (Mill Technologist) has returned from his secondment to the Flax Committee, but Mr. N. G. Cassidy (Analyst) resigned to accept a position at the Irrigation Research Station at Griffith, New South Wales. Scholarships in mill technology were awarded to two students in the School of Applied Science in the University of Queensland—namely, Messrs. C. B. Venton and L. R. Brain. They will take up duties at the end of 1945 and 1946 respectively.

We are thankful to be able to record that all staff members who went on active service with the Army and Air Force are alive and well, and we look forward to their safe return in the near future.

The Future of Our Export Market—What the British Farmer is Thinking.

Now that the policy of imperial preference, which is so important to the Australian producer of export primary commodities—wool and sugar; meat and wheat; and butter and cheese—and which is now more or less under review, apparently, as a consequence of the ending of the wartime lend-lease arrangement with America, it's interesting to know what the British farmer is thinking.

The farmer in the Homeland hasn't forgotten his experience after the first world war, and when everyone now has a post war plan up his sleeve, or in his hip pocket, he is wondering if he is going to be overlooked again. While the last war was on, he worked his land in accordance with a national pattern and fitted himself into the scheme of things as neatly as a piece of a jigsaw puzzle; but where he will come into the post-war picture is his immediate concern. Naturally, he would like to go on as he is going now under a Government guarantee of good prices. If foreign countries, whose supplies were regulated, are allowed to dump their farm produce onto the British markets, as they did before the war, what will happen to him? That's what the British farmer is thinking—and asking. Future prices, future imports—that's his bugbear at the moment. He doesn't want to fight any more losing battles, as he had to do after other wars. He has seen the transformation of his whole countryside during the war just ended. As our returning Air Force men tell us, "throughout the length and breadth of Britain once-neglected farms roll on and on like an endless, well-kept garden." Britain today is farmed by science and that is one of the results. The farmer has seen a new system work, a system which put more money into his pocket, even though he had to give a lot of time to filling in forms, wondering, perhaps whether he was farming with a plough or with a fountain pen. Standing on the brink of to-morrow, he is turning over in his mind the poser whether the dawn of a new day will herald the end of a period of strenuously acquired prosperity.

Here are some facts which may affect the principle of Empire preference and the market for our own exportable surpluses: The British Government, as part of its rural programme, is promoting a vigorous live stock breeding policy as a peacetime carry-over. County livestock pools are buying pedigree bulls for the use of local farmers. Crop rotation—ploughland to grassland and grassland to ploughland—is an extending practice. The wartime-sponsored machinery pools have driven salient pointers into the most conservative farmer's mind. There is a growing conviction that farming with hand and horse is fine physical exercise, but poor economy. Before the war there was a 2,000-acre tract of country in one county with only one plough on it—and that plough was used to plug a hole in a fence! Such a thing, it is believed, will never happen again. Machinery pools have, apparently, come to stay in Britain.

One big farm, in what is called the Garden of England, is a profitable going concern run by a wholesale and retail co-operative society—thus the co-operative idea is catching on and cashing in. Machinery pools are no longer regarded as a fad, and from them has grown a system of contract service for the bigger farming jobs. Science is marching with mechanization. The farmer is giving up farming by guess. He knows that the research worker can tell him what is wrong with his soil, how he can protect his crops from pest attack and keep his land free from noxious weeds. The merging of the County War Agricultural Committees with Government advisory services is already foreseen, so that wartime compulsion may give way to peacetime friendly assistance.

Throughout Britain there is now a growing desire for a big, strong farming population. Science and machinery together, it is said can produce more per acre for the same work, and this will help to keep farm wages up and so make country life more attractive to the wages worker.

That, among other things, is what the British farmer is thinking. The implication is that we also should continue our thinking about the future of our export trade in primary products and the possible effects on Australian agriculture of changing imperial policies.

RURAL BROADCASTS.

The Country Hour.

On Monday, 3rd December, 1945, the Australian Broadcasting Commission inaugurated an Australia-wide agricultural session known as "The Country Hour." The Country Hour is presented daily over National Stations 4QG, 4QS, 4RK, 4QN, 4AT, and Short Wave VLQ3, at the following times:—

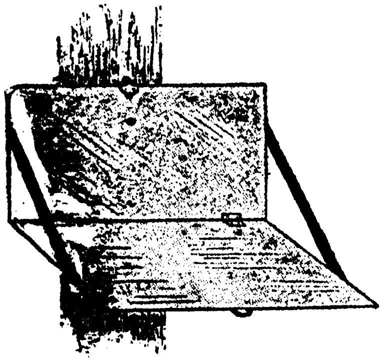
p.m.	
12.15	Opening announcements and highlights of rural interest.
12.18	Interstate market trends and prices.
12.21	Brisbane Market reports.
12.30	News.
12.45	Music.
12.48	Agricultural talk or actuality broadcast.
1.00	"The Lawsons."
1.12	Closing announcements and music.
1.15	End of Country Hour.

The speakers for the agricultural talk or actuality broadcast at 12.48 p.m. on Mondays, Wednesdays, and Thursdays are selected from among agricultural advisers all over Australia. On Tuesdays, speakers broadcast over the State Network from Brisbane.

Other essential services for people on the land are broadcast Monday to Saturday at 6.20 p.m. from 4QG, Queensland Regionals and VLQ2, and at 6.30 a.m. Monday to Saturday, from 4QG, Queensland Regionals and VLQ.

On Saturdays at approximately 1 p.m. 4QR, Regionals and VLQ3 broadcast weather reports and interstate fruit train loadings.

GADGETS AND WRINKLES

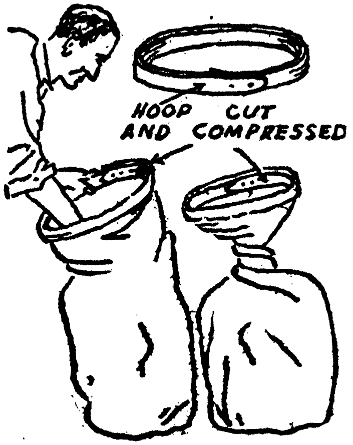


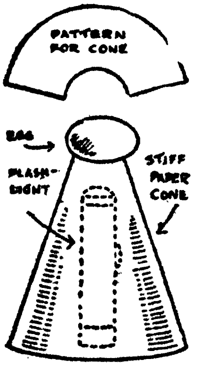
RECORD COVER.

A handy device for keeping milk record sheets or health and breeding record sheets clean and readable is to build a small cabinet for them. Take two pieces of board a little larger than the size of the sheets to be used, fasten together with a pair of small hinges, place straps or light chain as shown in the illustration, and attach one side of the cabinet firmly to the barn wall. This can be closed when not in use, and when open forms a handy shelf to write on.

TO KEEP SACK OPEN.

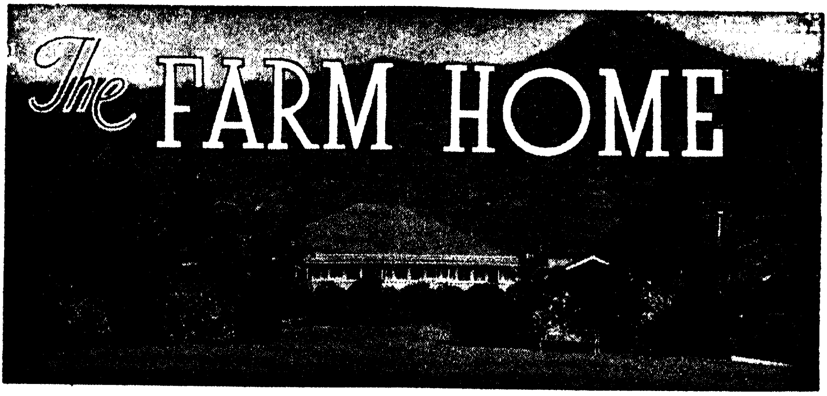
When feeding livestock or poultry from sacks, waste of feed by spilling can be avoided by placing in the mouth of the sack a cut hoop from a small barrel. Compress the hoop to insert and when it is released it will keep the sack open for easy removal of the contents. The sack is quickly closed by twisting the hoop.





EGG CANDLER.

The material required to make this egg candler is paper for a stiff paper cone. It is cut according to the pattern shown. The top opening is large enough to hold an egg without permitting it to drop through. A two-cell torch provides the illumination.



Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

BABY'S SKIN IN HOT WEATHER.

WEEKS of hot, humid weather have brought reports of babies suffering from prickly heat and other skin rashes from all welfare centres. Therefore some notes on skin care may be helpful to mothers whose children are affected in this way.

Knowing how to look after a baby's skin is very important both for his comfort and appearance. Every mother likes to see her baby with a clear healthy skin, and with good care, careful dieting and suitable clothing this should be possible for every baby.

Clothes, of course, are an important factor, especially in hot weather. Tight clothing quickly causes chafing under the arms and round the neck, and a baby's soft skin is very likely to become irritated by woollen garments. A loose cotton singlet, napkin and loose dress of cotton or art silk material provide quite enough clothing on hot days, with the addition of a little jacket if a cool breeze comes up.

Among the most important items in a baby's clothes are his napkins. Choose a soft material such as flannelette and remember that however soft the material, a napkin becomes a source of irritation as soon as it is wet. Therefore, regular changing is imperative. Waterproof panties should not be used, as the rubber acts as a poultice, keeping in the dampness and heat against the skin. Patterns of neat little pants to be made up with fine flannel are obtainable and these are quite sufficient protection for the mother's dress when carrying baby out. Napkins should be washed, boiled and rinsed in plain water, using a good brand of household soap. Patent washing powders, soda or blue should not be used, as all these chemicals irritate the skin.

In hot weather, the baby should have two baths a day, morning and evening, and a sponge in between whiles, if he seems fretful with the heat. Add 1 teaspoonful of salt and one teaspoonsful of soda to each pint of softened water for the bath. If tank water is not obtainable, a small handful of bran or oatmeal tied in a piece of old linen and left in the bath will soften the water. The same oatmeal may be used several times. A superfatted soap such as Castille is best—avoid highly scented varieties.

The baby's bed should not be too hot. A firm mattress with a cool chaff shakedown on top is best. A pillow is not necessary, and will only make the baby perspire. Choose a cool room or verandah, provided the infant is screened from direct draught.

If the baby is troubled with skin rashes, ask a doctor or sister at the local welfare centre to check over his diet.

Prickly heat is caused by moisture plus irritation from friction. The baby should have an alkaline bath as previously mentioned, be very gently and carefully dried and a special powder dusted on to his skin, in addition to the care already suggested.

Everyone picks up some germs on to the skin, and when the skin is excessively moist, the germs will multiply and enter the skin through a chafed surface—thus the baby may develop an infected skin condition. So cleanliness and care should be the mother's watchword at any time, but especially in hot weather.

Any further advice on this or any other matter can be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau*, 184 *St. Paul's Terrace, Brisbane*, or by addressing letters, *Baby Clinic, Brisbane*. These letters need not be stamped.

IN THE FARM KITCHEN.

French Pancakes.

Dissolve 2 tablespoons butter in 1 cup hot milk. Beat 1 egg well, add milk and butter, sift in slightly *more* than ½ cup self-raising flour and a pinch of salt. Beat till smooth, pour batter on hot greased girdle to form pancake 3 inches across, and cook both sides. Sprinkle with sugar and lemon juice and roll.

Flap Jacks.

Two cups flour, ½ teaspoon salt, 1½ teaspoons baking powder, 2 cups milk, 1 beaten egg, 2 tablespoons melted fat, ½ cup grated cheese. Mix and sift dry ingredients. Add egg, milk, fat. Mix well. Melt enough fat in skillet to cover bottom. Make six large thin pancakes about 5 inches across. Brown on both sides. Put meat filling (see below) in centre of each pancake. Lap pancakes into rolls. Sprinkle with cheese. Put rolls in hot oven (400 deg. Fah.), or in broiler, until cheese melts.

Meat Filling.—Blend 3 tablespoons of fat with 3 tablespoons flour. Slowly add 1 cup milk (or stock). Stir to keep smooth. Add 1½ cups chopped, cooked meat (veal or chicken). Add ½ cup diced celery. Cook slowly until celery is tender. Add ½ teaspoon salt and pepper mixed.

Potato Pancakes.

Required: Three medium size raw potatoes, 1 tablespoon of flour, 1 tablespoon of cream, 1 teaspoon of salt. Wash, peel, and grate the potatoes. Add other ingredients. Stir well. Cook by spoonfuls in a heavy frying pan in hot fat.

Pikelets.

Sift 1¼ cups self-raising flour and a pinch of salt into a basin. Make a well in centre and drop in 2 egg yolks and ¾ cup milk, gradually beat in all the flour. Mix to a smooth batter, then add 2 tablespoons melted butter, and fold in 2 stiffly-beaten egg whites. Drop batter from tip of spoon on to hot greased griddle. Bake, turning each cake when it is browned on underside and puffed and slightly set on top. Pikelets should be turned only once. Serve cakes as soon as baked on warm plates with butter and honey or orange marmalade.

Apple Fritters.

Make a batter of 1 cup of flour, 1 egg, two-thirds cup of milk, 1½ teaspoons of baking powder, ¼ of a teaspoon of salt. Mix all the dry ingredients—or sift them all together. Add the beaten egg and gradually the milk. Beat until smooth. This fritter batter is always useful. Four large apples must be peeled and cored and cup into very thin slices. Sprinkle some powdered sugar over the slices as well as a little lemon juice. Dip the slices in the batter and fry slowly in deep, hot fat until brown. Remove with a skimmer, thus draining all the fat. Sprinkle with cinnamon and powdered sugar and serve at once. Pears, oranges, apricots, and so on may be served as fritters. The treatment is the same as apple fritters.

Use Cooked Pumpkin.

Two tablespoons cooked pumpkin (left over), a dessertspoon grated cheese, and a teaspoon butter, well mixed until a smooth paste. Makes a cheap and tasty spread.

Ginger Bread.

One cup of butter, 4 eggs, 1 cup treacle, 1 cup milk, 3 cups flour, 2 cups sugar, 1 tablespoon ginger, 1 teaspoon baking soda. Cream butter and sugar, then add eggs and beat well. Add the milk, then add the dry ingredients, and mix well, and bake in a moderate oven for about 1½ hour.

Water Biscuits.

Rub 2 oz. of butter into 1 lb. of flour, adding a pinch of salt to the flour. Mix to a very stiff paste with water, and beat it well with a rolling pin. (This last is important.) Take pieces of the paste the size of a walnut and roll out round. Prick with a skewer or biscuit pricker, and put the biscuits on a hot baking sheet and bake them in a very hot oven.

Eggless Cake.

Two cups sugar, 2 cups water, 2 tablespoons butter or good dripping, small piece of lemon peel, 1 lb. dates. Put on to boil, and when boiling allow to simmer five minutes. Set aside until mixture is lukewarm, then sift in 4 large cups of self-raising flour, 1 teaspoon carbonate soda, cinnamon and mixed spice. Put into a deep, well-greased baking dish, bake in a hot oven one hour. This cake can be iced or left plain.

Lemon Slice Biscuits.

Take 4 oz. butter, ½ lb. self-raising flour, 3 oz. sugar, 1 egg, juice and rind of lemon, pinch of salt. Beat butter and sugar to a cream, add rind and juice of lemon, sieve flour and salt, beat egg well. Add flour and egg alternately to the mixture till of a stiff consistency. Roll out and cut into shapes, bake in hot oven for ten minutes. When cold join with butter icing.

Meat Salad.

One pint diced meat, 1 teacup cooked green peas, 1 small boiled beetroot, 3 tablespoons mock French dressing, 1 large lettuce or endive. Mayonnaise or salad cream. Mix the meat with the dressing. Soak for half an hour. Drain, then add green peas and mayonnaise or salad cream to taste. Arrange in a salad bowl, or on individual salad plates, ringed with crisp lettuce or endive or a little of each. Garnish with beetroot. Sprinkle, if liked, with a little chopped caper or nasturtium buds. Enough for six. If using cold lamb or mutton add ½ tablespoon finely minced mint leaves with mayonnaise. Garnish lettuce, if liked, with a dab or two of red currant jelly. If using cold veal flavour mayonnaise to taste with paprika, if available.

Brawn or Tongue Salad.

One pint diced brawn or tongue, 1 teacup shredded cabbage heart, 1 lettuce or watercress, ¼ pint each of diced cooked carrot, turnip, and peas, 1 pint potato salad. Any salad dressing. Mayonnaise or salad cream. Mix the meat and cabbage with salad dressing to moisten. Moisten the cooked vegetables also with this dressing. Chill both for half an hour. When required coat meat with salad cream or mayonnaise and arrange in centre of salad dish. Place half the potato at each end, and the cooked vegetables in between. Garnish round edge with watercress or lettuce. If liked, sprinkle potato salad with minced chives or parsley, the cooked vegetable salad with paprika, and the meat with minced onion or with a little mustard and cress. Enough for six persons.

Fish Salad.

One large lettuce or two small ones, a little chopped parsley, ½ lb. flaked cold fish, mixed cold cooked vegetables, cold boiled rice or haricot beans, a little grated cheese, 1 hard-boiled egg. Wash the lettuce, dry well, and shred into a dish. Pile the flaked fish, previously seasoned, in the centre, sprinkle over the top of the fish the grated cheese and round the base the chopped parsley. Dice the vegetables and place in small heaps round the dish with alternate heaps of the rice or haricot beans. Cut the white of the egg into strips, arrange in a circle, like the petals of a daisy, or the heaped vegetables with a little of the sieved yolk to form the centres. Serve a vinegar and oil dressing separately. This salad is sufficiently substantial to form the main dish for a meal in hot weather.

ASTRONOMICAL DATA FOR QUEENSLAND.

APRIL.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	5.57	5.47	Cairns	19	38	Longreach	31	29
6	6.00	5.41	Charleville.. ..	26	28	Quilpie	36	34
11	6.02	5.36	Cloncurry	44	56	Rockhampton ..	6	14
16	6.05	5.30	Cunnamulla ..	30	28	Roma	16	18
21	6.08	5.26	Dirranbandi ..	21	17	Townsville.. ..	17	33
26	6.10	5.21	Emerald	15	23	Winton	35	45
30	6.12	5.18	Hughenden ..	29	41	Warwick	4	3

TIMES OF MOONRISE AND MOONSET.

At Brisbane.

Date.	Rise.	Set.
	a.m.	p.m.
1	4.33	5.25
2	5.37	6.03
3	6.43	6.42
4	7.50	7.23
5	8·58	8.08
6	10.06	8.57
7	11.13	9.52
	p.m	
8	12.16	10.50
9	1.14	11.51
10	2.05	..
		a.m.
11	2.49	12.52
12	3.28	1.52
13	4.04	2.50
14	4.36	3.46
15	5.07	4.41
16	5·38	5.34
17	6.09	6.27
18	6.42	7.20
19	7.18	8.13
20	7.56	9.07
21	8.39	10.01
22	9.26	10.54
23	10.18	11.45
		p.m.
24	11.13	12.33
25	..	1.19
	a.m.	
26	12.12	2.02
27	1.12	2.41
28	2.13	3.19
29	3.16	3.56
30	4.21	4·34

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	22	17	38	33	13	8	44	37
6	12	28	27	43	2	19	30	51
11	13	27	28	43	2	18	31	51
16	21	18	37	34	12	9	43	38
21	29	11	44	26	19	1	52	29
26	27	13	43	28	18	3	50	31
30	19	20	35	37	10	11	39	42

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	36	24	55	46	40	32	30	21
3	25	36	47	55	32	40	22	31
5	13	45	40	60	25	46	14	37
7	7	51	36	64	21	50	8	43
9	6	50	36	63	20	49	7	42
11	11	48	38	62	23	48	11	40
13	19	41	44	58	29	43	18	34
15	29	27	50	48	35	33	25	23
17	38	21	56	45	41	30	32	19
19	46	12	61	39	46	24	37	13
21	52	6	66	35	50	21	43	8
23	52	4	66	34	50	20	43	6
25	48	8	63	36	47	22	39	9
27	44	15	60	41	45	26	36	15
30	28	33	50	53	34	38	24	28

PHASES OF THE MOON.

New Moon, 2nd April, 2.37 p.m.; First Quarter, 9th April, 6.04 a.m.; Full Moon, 16th April, 8.47 p.m.; Last Quarter, 25th April, 1.18 a.m.

On 14th April the Sun will rise and set 10 degrees north of true east and true west, respectively, and on 15th April the Moon will rise at true east.

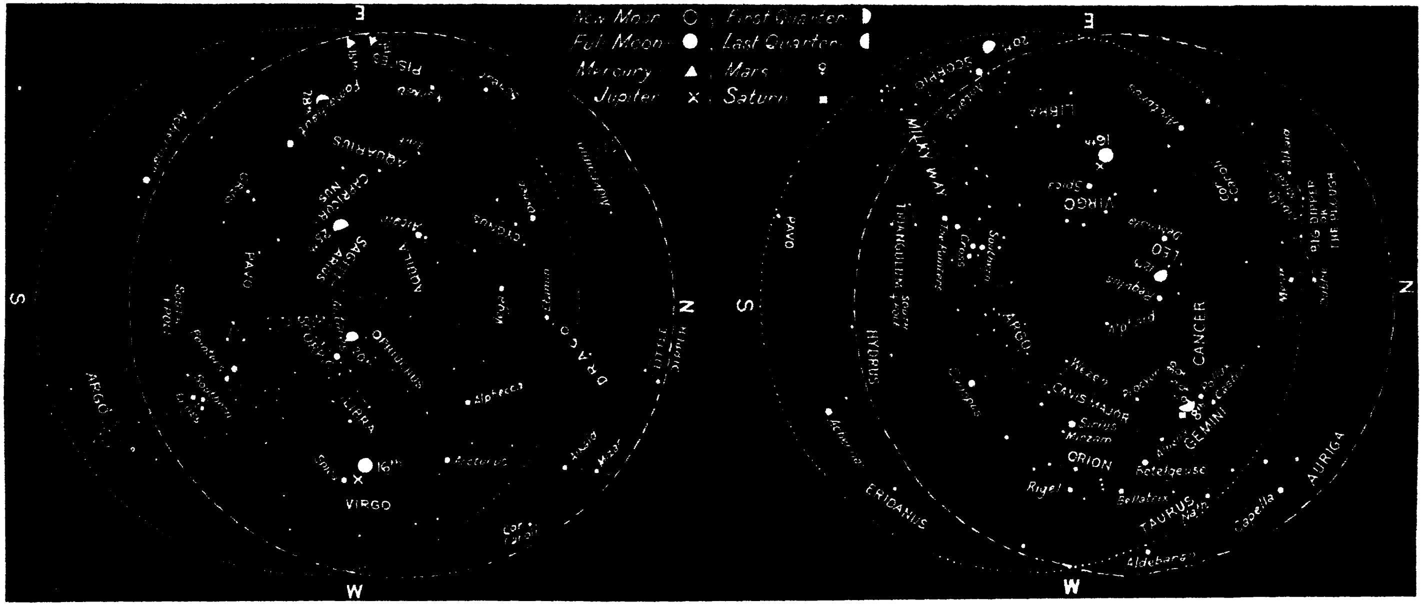
Mercury.—At the beginning of the month rises about 35 minutes before sunrise and at the end of the month rises 2 hours before sunrise, about 2 degrees north of true east.

Venus.—At the beginning of the month Venus will set about 45 minutes after sunset. At the end of the month it will be above the western horizon for a little over an hour after sunset.

Mars.—At the beginning of the month will set about midnight, and at the end of the month about an hour earlier.

Jupiter.—At the beginning of the month will rise a little after sunset and at the end of the month will rise about an hour before sunset.

Saturn.—Will set about midnight at the beginning of the month and at the end of the month will set between 10 p.m. and 11 p.m.



Star Charts.—Only the brightest stars are included and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. The positions of the moon and planets, which are continually changing in relation to the "fixed" stars, are shown for certain marked days. When no date is marked the position is for the middle of the month. When facing north hold "N" at the bottom; when facing south hold "S" at the bottom, and similarly for the other directions.

The chart on the right is for 8.15 p.m. in the south-east corner of Queensland to 9.15 p.m. along the Northern Territory border, on 15th April. The chart on the left is for 8 hours later. On each chart the dashed circle is the horizon at Cape York and the dotted circle is the horizon along the New South Wales border.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

FEBRUARY RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Feb.	No. of years' records.	Feb., 1945.	Feb., 1946.
North Coast.	In.		In.	In.
Atherton	11·44	42	25·14	14·56
Cairns	16·30	61	27·72	20·61
Cardwell	17·00	71	21·93	20·02
Cooktown	13·71	67	14·59	14·93
Herberton	8·63	57	17·10	11·37
Ingham	17·12	51	33·06	18·16
Innisfail	23·07	62	44·88	33·34
Mossman	20·86	19	17·79	22·04
Townsville	11·33	72	12·09	18·38
Central Coast.				
Ayr	9·62	56	16·59	11·99
Bowen	8·96	72	7·49	10·22
Charters Towers	4·63	61	2·55	7·45
Mackay	12·41	72	3·23	3·36
Proserpine	13·85	40	6·55	9·71
St. Lawrence	7·67	72	2·65	4·49
South Coast.				
Biggenden	4·18	44	7·49	1·40
Bundaberg	6·39	60	7·42	1·30
Brisbane Bureau	6·23	94	10·77	7·32
Caboolture	7·82	67	16·74	5·89
Childers	6·42	48	12·21	2·25
Crohamhurst	12·48	50	9·74	8·17
Esk	5·24	56	6·26	4·80
South Coast—cont'd.	In.		In.	In.
Gatton College	3·52	44	7·17	..
Gayndah	4·20	72	4·61	1·30
Gympie	6·58	73	6·28	4·73
Kilkivan	4·91	62	7·46	6·20
Maryborough	6·65	72	6·95	2·24
Nambour	9·57	47	9·34	8·36
Nanango	3·93	61	7·65	3·29
Rockhampton	7·74	72	3·36	2·95
Woodford	8·05	55	7·53	5·95
Darling Downs.				
Dalby	2·85	73	6·05	2·42
Emu Vale	2·59	47	5·07	1·87
Jimbour	2·75	64	4·66	3·00
Miles	2·72	58	8·14	2·03
Stanthorpe	3·18	70	5·24	1·41
Toowoomba	4·53	71	4·44	3·27
Warwick	3·10	78	2·51	2·75
Maranoa.				
Roma	2·87	69	3·51	0·20
St. George	2·39	62	2·76	1·27
Central Highlands.				
Clermont	4·27	72	1·73	3·30
Springsure	3·78	72	0·93	1·54

CLIMATOLOGICAL TABLE FOR FEBRUARY.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure Mean at 9 a.m.	SHADE TEMPERATURE.		EXTREMES OF SHADE TEMPERATURE.				RAINFALL.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Coastal.									
Cairns	..	86	74	95	4, 5	71	2	2061	20
Herberton	..	81	64	86	3, 4, 23	59	2, 3, 4, 5	1137	23
Townsville	..	89	75	96	21	72	9	1838	16
Rockhampton	29·84	89	73	96	3	70	3, 13, 25	295	11
Brisbane	29·91	85	71	82	4	67	24	732	17
Darling Downs.									
Dalby	..	91	68	100	3	62	1	242	7
Stanthorpe	..	81	62	91	20	56	2	141	9
Toowoomba	..	81	65	96	3	60	24	327	14
Mid-Interior.									
Georgetown	29·75	91	73	96	20, 23 24	70	11	991	13
Longreach	29·82	99	75	104	21	68	8	61	5
Mitchell	29·84	95	71	101	2, 3	57	5	176	3
Western.									
Burketown	..	91	76	97	4	72	5	1850	15
Boulia	29·71	96	76	105	3	65	28	194	8
Thargomindah	29·78	98	76	110	2	59	28	17	2

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

Volume 62 Part 4

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

APRIL, 1946

Issued by Direction of
THE HONOURABLE H. H. COLLINS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBAN

Contents

PAGE.

Event and Comment

The Right Use of Land 195
The Hon. H. H. Collins 197

Field Crops—

Flue-curing Tobacco . . 198

Fruit Culture—

Papaw Culture in Queensland . 202
Deficiency Disorders in Deciduous Fruits 215

Plant Protection—

The Fruit Spotting Bug .. 229

Answers to Correspondents

Hibiscus. Ragweed 233
Gambia Pea . 233
Cape Cotton . .. 233

The Dairy Industry

Milk Spoilage by the Can . 234
Production Recording . 236

Sheep and Wool—

"Swelled Head" of Sheep 238

Poultry—

Eggs—Preserve Their Quality .. 241

PAGE.

General Notes—

Staff Changes and Appointments 247
Butter Concentrate 247
Queensland Dairymen's Organisation 247
Veterinary Science Scholarships 247
Northern Pig Board 247

Rural Topics—

Food by Air 248
Working for a Better World 248

Gadgets and Wrinkles—

Shear Cuts for Rivets .. 249
An Improvised Concrete Mixer .. 249

The Farm Home—

How Mothers and Children Can Obtain their Vitamins 250
In the Farm Kitchen 251
Queensland Weather in February 252
Queensland Weather in March 253
Astronomical Data for Queensland 254
Rainfall in the Agricultural Districts 256
Climatological Table for March 256

:: BEANS ::

GOVERNMENT CERTIFIED DISEASE FREE AND GERMINATION. IN 1 BUSHEL SEALED BAGS

BROWN BEAUTYS 87/6 Bushel HAWKESBURY WONDER 92/6 Bushel

ORDINARY GOVERNMENT CERTIFIED FOR GERMINATION

BROWN BEAUTYS 67/6 Bushel CANADIAN WONDERS 82/6 Bushel

WHILE BEANS LAST

LUPINS— Bushel
N.Z. Blues - 13/6
Dun Field Peas 15/-

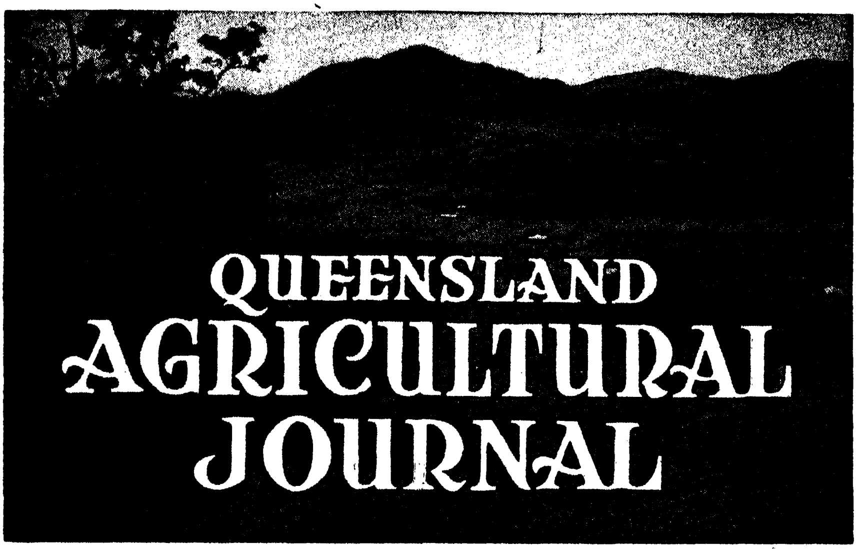
PUMPKINS— lb.
Queensland Blues 5/-
Cattle - - - 2/6

RAPE— lb
Dwarf - - - 1/1
Giant - - 1/2

All Prices subject to Stocks
Full Seed List on Application

STATE PRODUCE AGENCY Pty. Ltd.
Agricultural Seedsmen, Farm Produce Agents,
266-274 ROMA STREET, BRISBANE.

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, including postage. General Public, **Ten Shillings**, including postage.



QUEENSLAND
AGRICULTURAL
JOURNAL

Volume 62 1 APRIL, 1946 Part 4

Event and Comment.

The Right Use of Land.

WHILE there was not a great area of agricultural land still unoccupied in Queensland, he realized that there was much which could be put to better use, said the Minister for Agriculture and Stock (Hon. H. H. Collins) when opening the recent Bundaberg conference of the Queensland Society of Sugarcane Technologists.

Such organizations as that established by the technologists, Mr. Collins continued, were invaluable in determining the best use to which land could be assigned. They had set high standards in both field and factory and had increased benefits to all engaged in the sugar industry by raising production, income, and the level of employment. Increased production had successfully countered the challenge of diminishing prices. He stressed the need for further efficiency in agriculture and urged farmers to use their available arable areas to even greater advantage. It was the right use of land with which they were all concerned.

Mr. Collins added that it was especially pleasing to him as a Minister and as a farmer to see the way the canegrowers and technologists were working together so effectively in the interests of their industry. Farmers were realizing more and more the benefits to be derived from the application of scientific methods, especially in respect of plant breeding and protection and the maintenance of soil fertility. Conservation must become the core of agriculture. The scientist was collaborating with the farmer in finding the answers to rural problems and the results already achieved had added greatly to the general prosperity of the State.

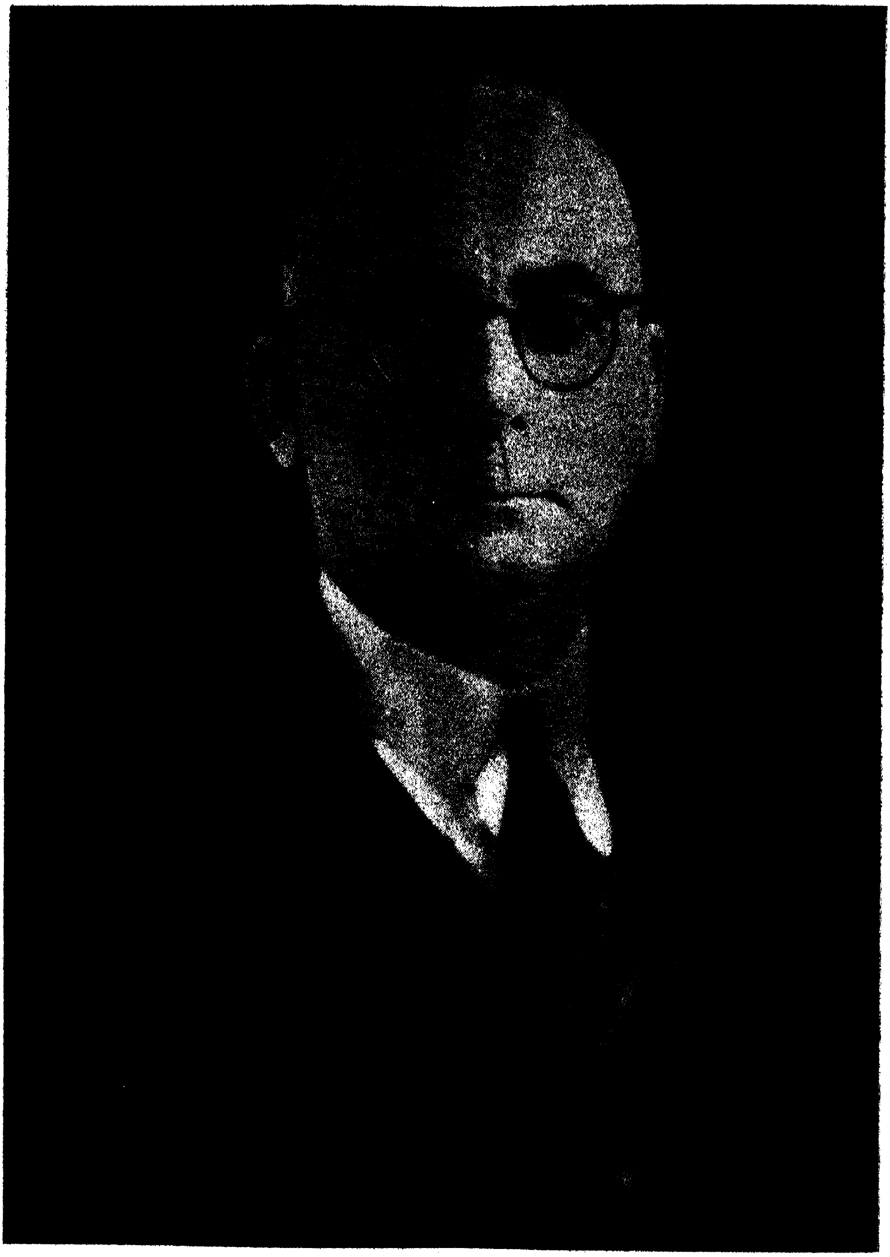


Plate 64.

The Hon. H. H. COLLINS.
Minister for Agriculture and Stock.

«» The HON. H. H. COLLINS «»
Minister for Agriculture and Stock

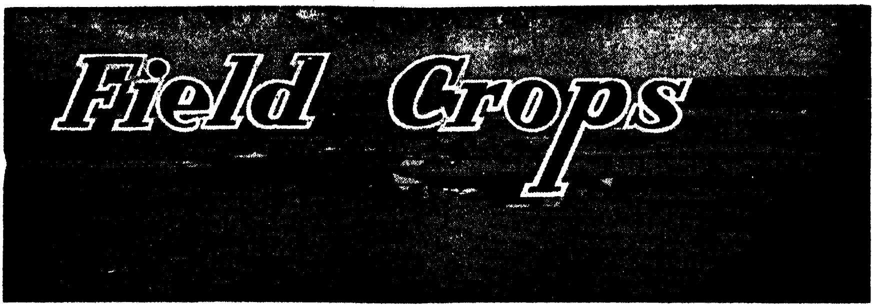
The Hon. H. H. Collins, who represents the Electorate of Cook in the Legislative Assembly, has been appointed Secretary for Agriculture and Stock in succession to the Hon. T. L. Williams who has taken over the portfolio of Secretary for Public Instruction.

Mr. Collins was born in Victoria and came to Queensland in 1909. For a number of years he was engaged in the pastoral industry and was for a time shed overseer with the Federal Shearing Company.

Attracted to the fertile country in the Far North, then still in the pioneering stage, Mr. Collins started farming on the Atherton Tableland in 1913. He associated himself with all progressive movements in the rapidly developing district and was elected a member of the Tinaroo Shire Council (afterwards the Atherton Shire Council). Among other public activities, he became President of the Atherton Show Society, a foundation member and Chairman of the Atherton Maize Board, a member of the North Queensland Bacon Company, and a foundation member of the North Queensland Pig Industry Board.

In 1935, Mr. Collins was chosen by a large majority as member for Cook in the Queensland Parliament and has since retained that seat by increasing majorities. He is known throughout the State, in the North particularly, as a practical farmer who has specialized with success in dairying, pig raising, and maize growing.

Mr. Collins brings to his office of Minister for Agriculture and Stock a wealth of experience in rural industries and a wide knowledge of farming practice and animal husbandry. As a student of agricultural economics, he is a strong supporter of the co-operative idea based on the principle that a country cannot thrive without prosperous primary industries as exemplified by better farming, better marketing, and better living.



Conditioning, Bulking and Grading Flue-cured Tobacco.

A. HAMILTON, Senior Adviser in Agriculture.

Conditioning.

WHEN the cure has been completed and the barn cooled down, the leaf will be dry and very brittle. In this state it cannot be handled without risk of damage; consequently, it must be permitted to absorb moisture from either the air or an artificially moistened atmosphere.

Usually when the door and ventilators of the barn are left open during the whole or part of the night, sufficient moisture will have been absorbed by the leaf to bring it into order for bulking. Should, however, weather conditions be particularly dry, with insufficient humidity to order the leaf, artificial means will be found necessary. Where the latter conditions obtain, the barn should be tightly closed down and steam at low pressure introduced into the barn. Damping of walls and placing of wet bags on the floor of the barn will also assist to create a humid atmosphere.

Whichever method of conditioning is employed great care should be taken to see that the tobacco does not absorb too much moisture. The leaves on the sticks of the lower tiers in the barn will come into condition first, and should be removed from the barn as soon as they are ready.

One point worth remembering, especially where steam is used in the conditioning of the leaf, is that with steaming there is often a "false" conditioning of the leaf. This is brought about by a too rapid introduction of steam into the barn, which does not allow of absorption of moisture by the leaf but rather causes the moisture to collect on the leaf surface. This collected moisture quickly evaporates on exposure, leaving the leaf harsh and brittle and liable to considerable damage when handled.

Where tobacco is grown on an extensive scale, the provision of a conditioning room in which atmospheric humidity can be controlled by artificial means would very materially assist in the proper conditioning of the leaf without delaying the availability of barn space. With the provision of such a conditioning room, it would be necessary to first render the leaf in the barn pliable enough to permit of its transference from the barn to the conditioning room.

Experience and judgment are necessary to determine the correct condition of the leaf for bulking down. The whole of the web of the leaf should be pliable and approximately half of the mid-rib from the tip should be supple, but showing a break before bending at right angles. The leaf may be either removed from the sticks straight away or bulked down on the sticks to await a more convenient time for its removal. In the latter case, care should be taken that the leaves lie evenly and that sticks are so placed that alternate sticks lie with the butts of the leaves outward. Care should be exercised when bulking down sticks that the tobacco leaf does not come into direct contact with the floor, and this can be accomplished by bulking down on bags, matting, or other suitable material. Should the bulked sticks have to remain for some hours in the bulk, a covering of bags should be placed over the bulk. This will assist to even the condition throughout the bulk.

Bulking.

The bulking of the leaf should be done as soon as practicable after the leaf has been brought into condition.

In removing the leaves from the sticks a sharp watch should be kept for "fatty stems" or leaves showing the midrib insufficiently dried out. The inclusion of any such "fatty stems" in the bulks will provide a very potent source of mould development in the bulks, which can in time cause much valuable leaf to become worthless.

During the period the leaf is in the bulk certain important changes occur which affect colour, aroma, and general smoking qualities, and it is most important that every endeavour be made to retain these qualities by close attention to both the condition of the leaf and the methods employed in bulking down.

Here it is worth remarking that the fine flue-cured type of leaf can be bulked down with slightly less condition than leaf showing a greenish cast and the heavier bodied mahogany types of leaf.

Perhaps the best method of bulking is on specially built racks of a convenient length, raised about 1 foot from the floor and roughly 4 ft. 6 in. wide. An added advantage would be the provision of a boarded covering which would slide down on to the top of the bulk and upon which the necessary weights could be placed. A number of such racks placed in series in the bulk shed would permit of a number of smaller bulks which could be easily and frequently inspected, and would allow the turning of any or all bulks should the necessity to do so arise.

It is necessary to stress the need for bulking the crop down as it is harvested from the plant. To every tobacco grower with experience of the crop, there is a considerable degree of difference in quality of leaf harvested from various parts of the plant. To mix these leaves of varying body and texture in the final grading and marketing of the crop is to very seriously lower its average value. It is obvious that mixing of different grades of leaf leaves the appraiser no choice but to value the sample not on the average grade, but on the lowest grade leaf showing in the sample.

In bulking the crop down, perhaps much can be gained by the grower if he follows the practice of bulking each barn separately. This method would overcome very largely the mixing of, say, lower lug leaf with heavier bodied leaf from the higher portions of the plant. Top leaves would be kept separate from middle leaves and so on. By so doing, a much better check can be kept by growers on the quality of their crops and so overcome to some degree the suspicions held by some that they are not receiving the full value for their leaf.

Grading.

As manufacturers require uniformity in the lots of tobacco they purchase, it is to the advantage of the grower to see that his crop is presented for sale in uniform grades. To accomplish this as nearly as it is practicable to do so, grading or sorting of the various leaf qualities found in any tobacco crop should correspond to their position on the plant. Where a crop has been bulked down with leaf corresponding to the position it occupied on the plant or in barn lots, the sorting or grading of each bulk will resolve itself into a matter of colour and length, taking care to eliminate all green leaf from the grades and making separate grades of damaged leaf.

Sorting.

Tobacco should be in proper "order" or condition for sorting. If in too dry "order" the tobacco will be injured through breakage while being sorted, as it is necessary that each leaf should be opened and inspected before being placed in its grade. On the other hand, tobacco in too high "order," or carrying too much moisture, will suffer discolouration and bruising, particularly with the fine, light-coloured leaf. Where this latter condition is allowed to arise a decrease in the value of the tobacco is the result.

Tobacco is in the correct order for sorting when just enough moisture has been absorbed to make the leaves pliable, and when they can be readily opened for inspection without breaking.

The sorting of tobacco for its presentation for appraisement is one of the most important operations, and one which generally does not receive the care and attention that is its due. By careful sorting and proper handling a crop of comparatively poor quality will show to better advantage than when haphazard methods and mixing of leaf quality have been employed to cover up the general poor quality of the crop. Equally, a crop of good quality can be greatly lowered in overall value by careless sorting and handling.

The main object in sorting is to present the crop in lots showing leaf of similar quality, colour, and length, and the presentation of each different lot separately, tied in hands, baled, and branded according to grade.

A method which should assist with the sorting of the leaf in each bulk, and one that would save time, is for the grower when bulking down a barn to select a dozen or more sticks representative of the leaf quality, colours, and length of leaf in the particular barn. These sticks could be left until last, roughly sorted into the various grades, and bulked down on top of the bulk. These graded sticks would represent roughly the grades in that particular barn or bulk and could be used as a guide in the subsequent sorting and grading of that barn or bulk.

Variation of Leaf Quality.

In the harvesting, curing and bulking down of the crop as it comes from the plant, or where the crop is bulked down in barn lots, it is inevitable that leaf quality will vary in the bulks. For instance, with lug leaves some individual plants in the crop will, through one cause or another, be "primed" higher than others, or where uneven ripening of the crop has occurred some lug leaves will be bulked with middle or "cutter" leaves. Most growers should be in a position through close contact with their crop to know the relative degree of variation of leaf quality that will be found in their bulks. With bulks of the first cures, which should consist of "lug" leaves, there will generally be two qualities of "lugs"—(1) the sand leaves showing leaf of dingy colour, thin to papery in body and generally with a percentage of injury characteristic of leaves grown near the ground (these leaves generally carry a noticeable amount of sand, which should be shaken from the leaves) ; (2) better quality "lug" leaves showing good, even colour, free of injury and showing some body. With "lug" leaves the grades in this division of leaf quality will be largely governed by colour, as colour will determine body in each grade.

The next division of leaf quality—the "cutters"—will be harvested in the third cure. Some "cutters" may be harvested during the second cure and some with the fourth cure, depending on seasonal conditions, the number of leaves harvested at each curing, and other factors. "Cutters" are generally larger than "lug" leaves, free from injury, more even in colour, fine textured, and of medium body. The colour range in this division of leaf quality will vary from lemon to orange, the lemon being of less body than the orange. Here care must be taken to sort carefully according to quality and colour.

The third division of leaf quality, which will comprise all leaf harvested above the "cutters" from approximately the fourth curing onwards, will consist of heavier bodied leaf, usually narrow and more pointed than the "cutters." The leaf in this division will vary considerably in length in individual plants, and the top leaves will be the shortest leaves harvested. The colour range will vary from bright mahogany to mahogany and dark and may show some injury. The leaf generally will be coarser in texture than leaf in the other divisions of leaf quality with from medium to heavy body, and care should be taken in sorting this leaf to avoid the mixing of grades in this division.

Proper Presentation for Appraisal.

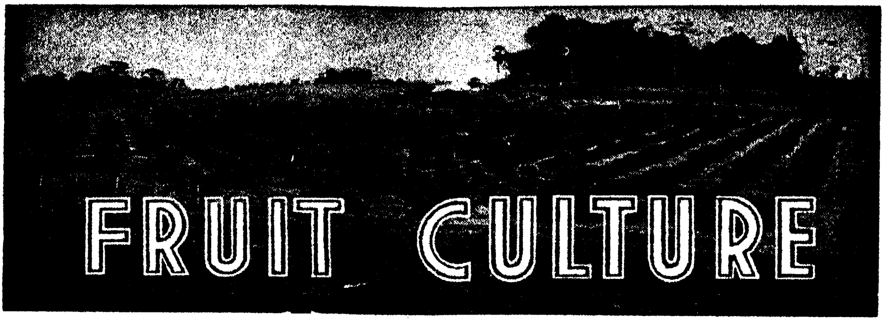
In the sorting and grading of the leaf in each division of leaf quality, it will pay the grower to see that each lot is properly presented in neatly tied hands, properly conditioned and neatly baled. The hands should not exceed 15 to 20 leaves, the lesser number in the larger and heavier bodied leaf, and each hand tied neatly with a leaf of the same grade as the hand.

The bulking down of the various lots in hands has much to commend it, but all such "handed" bulks should be well and securely covered and marked according to their respective grade.

In baling excessive pressure is not desirable; particularly is this so with the fine, bright coloured grades of leaf. Particular care and judgment must also be exercised in baling to see that the leaf is not in too high condition. In this connection, it is perhaps better to have leaf slightly under-conditioned, especially where leaf has to travel long distances, as is the case in Queensland.

In conclusion, it should be remembered that from seed beds to the bulking down of the crop months of labour and much capital are expended, but without the skilful and thorough care of the crop through its various stages of growth, the curing, bulking, and grading much labour and capital will have been expended in vain. Unfortunately, seasonal conditions always exert a powerful influence upon both quality and yield of tobacco in Queensland, but, as leaf quality is the criterion upon which tobacco is valued or appraised, it is to growers' interest to make every endeavour to present their crop properly graded according to the quality of that particular crop.

From the manufacturer's viewpoint, the individual merit of each lot submitted is of more importance than the marked grade, for the merit of each lot will determine to the manufacturer the leaf quality of the lot and its value to him in manufacture.



Papaw Culture in Queensland.

G. W. J. AGNEW, Horticulture Branch.

PAPAWS grow best in the wet tropics, where the high temperatures and rainfall provide conditions for continuous growth and development during most of the year.

A warm sheltered position on rich well-drained soil with abundant rain will produce high-yielding vigorous plants. Optimum conditions such as these are not encountered on the majority of Queensland's papaw plantations, as by far the greater number occur on the south-eastern coast, where winter temperatures during the four months from June to September, combined with cold winds and frequently occurring early summer droughts, are often sufficiently severe to affect adversely the development of the plant (Plate 65) or the maturation of the fruit. Occasional severe frosts, such as occurred in 1943, cause widespread damage among papaw plantations in low situations. By contrast, North Queensland plantations are not subject to the effects of frost or cold wind and the rainfall is much more favourable; however, cyclonic winds do occasionally take toll of plants in exposed positions on the tropical coast.

Although some hazards do exist, many excellent plantations are to be found in various select positions along almost the whole length of the Queensland coast. The following districts are the chief sources of papaws in this State:—

South Coast, from Coolangatta to Cleveland;

Brisbane district, including Sunnybank, Brookfield, and Aspley;

Near North Coast, in the vicinity of Nambour, Gympie, the Mary Valley and Gunalda;

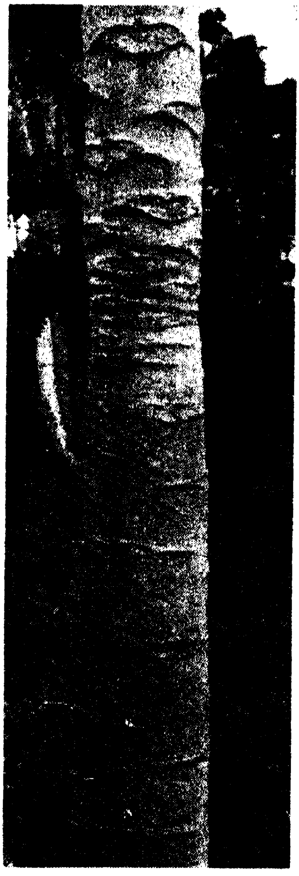


Plate 65.
THE EFFECT OF WINTER CONDITION ON PAPAW PLANT DEVELOPMENT IS SHOWN BY THE CONSTRICTION OF THE STEM.

Central Coast district, principally the Yarwun area, Rockhampton, and Mackay;

Far North Coast areas of Ayr, Townsville, Cardwell, and Cairns.

Owing to the long distances from the larger southern markets and the attendant transport difficulties associated with such a perishable product, together with the absence of canning facilities in the north, the far north coast, though eminently suited to papaw growing, has been largely limited to supplying small local markets.

Plate 66.
A Papaw Tree Carrying a Crop of Good Quality Fruit.

Whilst the papaw is not a very difficult plant to grow, it will be found that attention to a number of details will materially enhance the prospects of establishing a commercial plantation and increasing the yield therefrom. The following sections deal with the important points to be observed.

PROPAGATION.

Seed Supply.

Until certified seed of proved varieties is available for general distribution, the papaw grower must rely for planting material on seed from fruit of recognized high-yielding trees, which produce good quality fruit (Plate 66).

Growers who wish to propagate from their own seed are referred to the Department of Agriculture and Stock Pamphlet No. 80, "Notes on the Papaw and its Improvement in Queensland," which deals in detail with the methods employed to secure pedigreed seed from chosen papaw trees of known performance.

Seed Treatment.

Seed freshly taken from the fruit should be cleared of the pulpy placental threads which generally adhere to them. The small membranous sacs of fluid surrounding the seeds may be broken by rubbing on a rough board and the seeds then freed of these by washing in water. They should then be placed in the shade, in shallow dishes, cardboard boxes or trays, to dry.

If it is intended to store the seed for a long period, it should be dusted with a fungicidal dust suitable for seed treatment and then stored away from the light in air-tight containers.

Time of Planting.

Successful germination may be obtained with papaw seeds at any time during the summer, from September to March.

Unless storm rains are experienced or irrigation is available, the early summer is a hazardous period in which to plant out young papaws, owing to hot drying winds and the danger from hail storms, which can seriously damage such young tender plants. If seeds are planted in early summer (October) they germinate in about ten days and the plants make rapid progress and commence flowering before winter retards further growth.

More commonly, however, seeds are planted during mid-summer (December) and young seedlings are then ready to transplant during late February or early March, when monsoonal rains usually provide wet and cloudy conditions suitable for the establishment of young trees in the field. These plants usually attain a height of about 2 feet before growth is virtually stopped by winter conditions, and flowering occurs about November. In this way March-planted trees generally bear their first crop closer to the ground than do trees planted early in the summer, which have a longer growing period during which the trunk may elongate appreciably.

Raising Seedlings.

There are a number of methods which may be used successfully in raising young papaw plants.

Seeds may be planted out directly in the field in their permanent positions. This method is generally adopted when plantings are made hurriedly, and also when planting in conjunction with crops such as pineapples, when the seeds are so placed that the leaves of the pineapples or other crop plant give protection and shade to the young seedlings. Planting out seed in an open field demands that constant care and attention be given, as otherwise many losses occur through the effects of insect enemies, disease and unsuitable weather. It is also necessary to have a fairly large supply of seed, as generally about a dozen seeds or more are planted to each tree position, and thinning operations carried out later if necessary. The advantages claimed for this method are that the procedure is simple; it eliminates losses due to transplanting; and deeper rooting is obtained.

Another method is to plant seed in prepared seed-beds and dig out seedlings for transplanting when they are about 6 inches high. A large seed-bed space is required for this practice, as plants cannot be spaced closer than about 4 inches apart without growing spindly. Roots are generally disturbed when transplanting is done and unless the lower leaves are pinched off the plants will probably wilt. A worthwhile practice, which reduces losses in transplanting from a seed-bed, is the wrapping of stems with a roll of firm paper from old books. This prevents scorching of the stems and keeps plants upright. It is always preferable to transplant on wet, cloudy days.

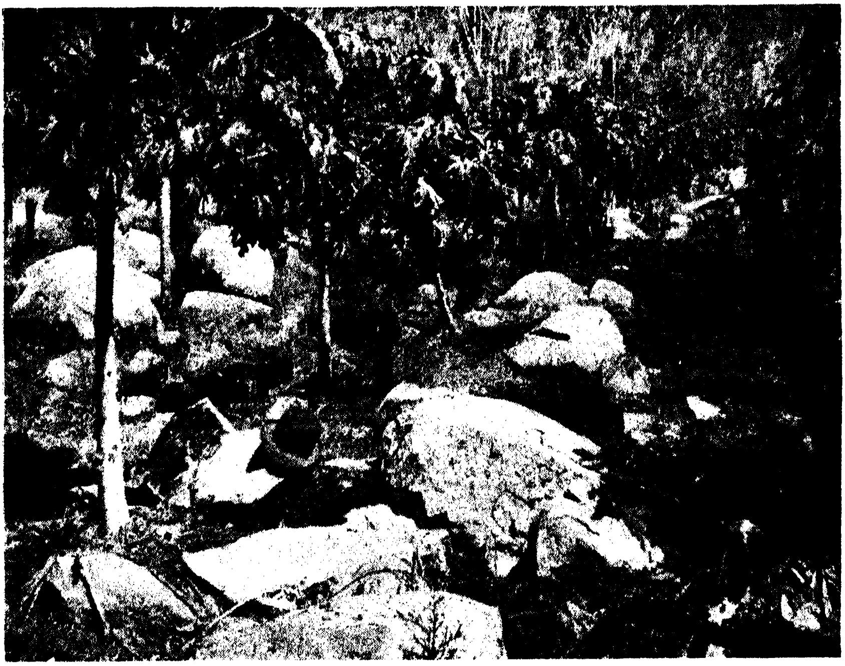


Plate 67.
YOUNG PAPAW TREES IN ROCKY COUNTRY.

A third, and probably the most certain, method of obtaining a good strike with young trees is that of planting in containers. Either the seed is planted directly in the containers, or seeds are first sown in shallow seed boxes holding 4 to 6 inches of soil, and when the plants are about 2 inches high they are transferred to containers such as fruit-preserving cans, sheet-metal tubes, or earthenware pots. Containers made from pineapple paper mulch have been used successfully for this purpose. When seedlings are from 6 to 8 inches high they are transplanted with the soil intact. Planting can be carried out successfully during dry weather provided plants are watered in, so that wilting does not occur. Two or three plants may be left in each container and later separated out at planting.

When transplanting, it is necessary to place plants at the same depth in the soil in their new positions as when they were in the seed-bed, otherwise the stems may become diseased. The importance of placing plants at the correct depth is often overlooked, with consequent failure.

PLANTING.

Tree Positions for Dioecious Papaws.

As there is no means of distinguishing "male" from "female" trees before flower buds appear, it is necessary to plant out at least three or four seedlings to each ultimate tree position (Plate 68). Normally, approximately 50 per cent. "males" and 50 per cent. "females" should result from a "male" and "female" cross, and the multiple planting allows for culling of any unwanted "male" trees. Thinning should be done so as to leave one "male" as a pollinator for every ten "females." In each tree position, only one "female" tree should be allowed to grow past the first flowering period, otherwise the plants become spindly.

If leaves are trimmed and roots carefully preserved, culled "female" trees can be dug out and replanted to other positions in wet summer weather. These trees will be set back somewhat, but if in healthy growing condition they soon recover.

Plate 68.

MULTIPLE PLANTING OF DIOECIOUS PAPAWS.

Tree Positions for Hermaphrodite Papaws.

It has been demonstrated, both in Queensland and overseas, that if hermaphrodite papaws are self-fertilized two-thirds of the progeny will be hermaphrodite and the remainder "females." If "females" are crossed with hermaphrodites, half the progeny will be hermaphrodites and the other half "females." In practice, this means the elimination of "male" trees in a planting where crosses of these types have been used, and all trees arising from the seed from these matings will be fruit-bearing; therefore, only one tree need be planted to each tree position. Good yields have been obtained in Queensland plantations of the hermaphrodite-female crosses.

If hermaphrodites only are required in the planting, then by planting three or four plants to each tree position the "females" can be culled out as in the case of superfluous "males."

Spacing.

Spacing distances for papaw plants in the field range from 6 feet by 6 feet to 12 feet by 12 feet according to the particular conditions. It has been observed that trees on virgin rain forest land grow very tall in the first year if planted too closely together, and thus often much of the first crop must be harvested by ladder. A spacing of 8 feet by 12 feet or 10 feet by 10 feet has been found suitable in these circumstances. Some growers plant 6 feet by 6 feet, but generally this is considered to be too close, for though good crops have been produced with this spacing, the trees commonly become spindly. A close planting tends to give greater protection to fruits, greatly lessening the effect of adverse winds and sun scald. As the papaw is primarily a surface rooting plant, the soil surface should be kept shaded during the hot dry summer months, and close planting tends to achieve this end.

Plate 69.
AN OLD PAPAW PLANTATION, WITH TREES 30 FEET HIGH, MAKING HARVESTING DIFFICULT.

It was demonstrated in Florida that a 6 feet by 6 feet spacing actually increased the weight of fruit produced by 62 per cent. on the average over other plantings spaced 6 feet by 9 feet and 6 feet by 12 feet. This large increase in yield is explained by the extra number of trees planted per acre. Trees with the wider spacing of 6 feet by 12 feet actually produced more fruits per tree, the average being 23 as against 19.3.

An 8 feet by 8 feet spacing is considered to be generally satisfactory for average plantation conditions, except for the convenience of cultural operations or the peculiar requirements of certain varieties, and wider spacings such as 9 feet by 9 feet, 10 feet by 10 feet, or 8 feet by 12 feet may be found to give greatest efficiency in particular circumstances.

TABLE OF SPACING DISTANCES FOR SQUARE PLANTING.

Distance Apart.	Number of Trees per Acre.
6 ft. x 6 ft.	1,210
7 ft. x 7 ft.	889
8 ft. x 8 ft.	680
9 ft. x 9 ft.	537
10 ft. x 10 ft.	435
12 ft. x 12 ft.	302

PAPAW GROWTH AND DEVELOPMENT.

During 1940 and 1941 an experimental area of 500 trees of the Florida Betty variety was established at Nambour, on the lower north coast, on land which had previously grown pineapples. The following observations were made on 32 trees representative of the planting.

Flower Production and Fruit Set.

During the principal flowering period from November to late January the average number of flowers produced per tree was 46, or slightly more than an average of four flowers per week. The percentage fruit set varied from 47 per cent. to 73 per cent. for individual trees, with an average setting of 63 per cent. for all flowers produced. A much lower percentage fruit setting could be expected from the late summer flowering, as the protracted wet weather often experienced in February, March, or April prevents natural pollination. There were slightly more than 10 per cent. "male" trees in this plantation to act as pollinators.

Yields.

The following table gives the percentage of fruits in grades according to weight, the largest fruits being mainly produced by December flowers:—

Fruit Weight.	Percentage.
Less than 1 lb.	4·3
From 1 to 2 lb.	12·8
From 2 to 2½ lb.	30·8
From 3½ to 5 lb.	29·3
From 5 lb. and over	22·8

Average tree production for the first crop from the main flowering period (November to January) was 29 fruits per tree, with average weight of 2 lb. 14 oz. per fruit, which gives a crop yield of 83·4 lb. per tree. This is equivalent to slightly more than 3 bushels.

Fruit Development.

The time taken for complete fruit development from flowering to maturity of the fruit varied from 175 to 275 days. Fruit from early summer flowers reached maturity in much less time than did those from late summer flowers.

Month of Flowering.	Fruit Development in Days.
November	175 to 185
December	175 to 240
January	230 to 260
February	255 to 275
March	230 to 260

The foregoing indicates that an early winter crop maturing in May and June was produced by November and December flowers, whereas the spring crop in August and September was produced by late summer flowers. The effect of winter in retarding maturation is evident by the additional time taken to reach maturity—in this instance from 50 to 70 days.

Plate 70.
A Branched Papaw Tree.

BRANCHING.

Branching (Plate 70) commonly occurs in papaws as a result of injury to the growing tip. Some strains, however, have a tendency to branch more than others and will do so to a considerable extent, even in the absence of an injury.

Where optimum conditions for vigorous growth are experienced, allowing young trees to carry branches has been successful; but most branched trees produce smaller fruit than single stemmed trees and, except under the most favourable growing conditions, the practice is not recommended.

Highly placed branches are often broken off from the main stem by wind or by the weight of fruit they are carrying, and branches which project at an angle from the main stem require propping or tying back to avoid this trouble.

CUTTING BACK.

Aged trees which are in a healthy condition can be rejuvenated by cutting the stem down at a point about 2 feet above ground where the stem is not hollow. This can also be done with young trees that have grown too tall for convenience of harvesting. After being so cut, the tree will shoot from a number of places on the stump, and two or three of the most vigorous shoots are then allowed to grow. This cutting operation should be done during the early spring so as to allow a sufficiently long growing period for the plant to recover. It is a good practice to cover the cut surface of the stem with a tin to prevent cracking and subsequent decay.

HARVESTING.

In Southern Queensland, though small quantities of fruit may be ripening throughout the most of the year, there are two important harvest periods—one during April, May, and June, and the other, which is really the main one, during September, October, and November. In Northern Queensland harvesting is spread over a longer period.

For local markets fruit should be harvested in the firm-ripe stage when the first colour is showing, and should fully ripen in from four to five days. For export to Southern markets fruit should be picked at an earlier stage, allowing about eight days before fully ripening. The stage of maturity, as gauged by external colouring of the fruit, will vary according to seasonal conditions, the variety grown, and the requirements of the buyer, but generally the fruit should be harvested at an earlier stage in the summer than in the winter.

Great care must be exercised in harvesting papaws in the firm-ripe stage as they bruise easily. The fruit should be cut from the tree and not pulled, as pulling often results in damage to the basal end. Fruit stalks should be cut close to the tree stem, to prevent remaining fruits from rubbing on the stub. Finally, the stalk on the fruit should be trimmed before packing.

The milky latex which exudes from the broken rind of immature papaws causes considerable irritation to the skin of the operator handling them for any lengthy period and the wearing of rubber gloves and an apron is therefore recommended.

SOILS AND FERTILIZER REQUIREMENTS.

In Queensland, papaw plantations are placed either on virgin land recently cleared of rain forest or hardwood forest, or on "old land," which has been under cultivation to pineapples, bananas, or other crops for several years. These soils vary considerably in type and include brown sandy soil, alluvial clay loam and red volcanic loam.

Many plantations are necessarily placed high up on hillsides to avoid frost, and are thus frequently associated with rocky and gravelly soils. A free draining soil is essential to healthy growth; waterlogging will result in stunted growth which is generally accompanied by disease.

Where natural soil fertility is high, excellent yields of high-quality fruit have been obtained without the use of fertilizers. More typically, however, plantation sites occur on soils of low or medium fertility, in which plant nutrient materials have been depleted by continuous cropping over a long term and by losses due to erosion and leaching. The papaw tree draws heavily on the water and plant food supply of the surrounding soil for at least eight months of the year during its active growing period, and to support and maintain this long period of activity liberal amounts of water and plant food must be available.

During 1940 and 1941 experiments were conducted at Nambour, on a brown sandy loam, typical of much of the soil on which this fruit is grown. All trees in the experiment received the same amount of nitrogen. There were no responses to phosphate or potash treatment, except in the case of phosphate after liming. Phosphates significantly increased the yield in the presence of lime and depressed the yield in the absence of lime. (Hydrated lime was applied at the rate of 4 tons per acre.) Soils under this test ranged in pH value from 4·5 to 5.

Experiments conducted at the Hawaiian Agricultural Experiment Station have shown that ample supplies of nitrogen and phosphate are necessary and that an increased quantity of potash is required after the flowering stage has been reached. The use of a 6-12-6 mixture, given at the rate of 2¼ lb. per tree per year, in four quarterly applications, has been found beneficial.

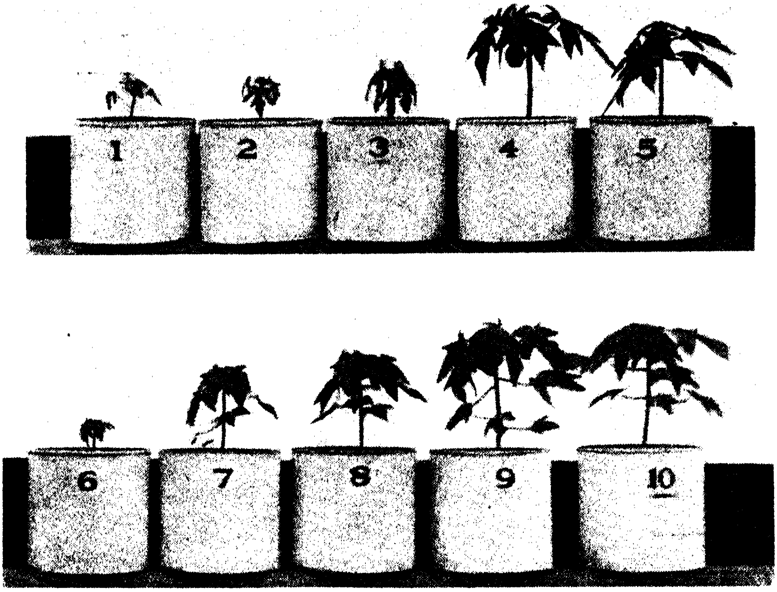


Plate 71.

Showing the Effect of Organic Manures (Pots 4, 5, 9, 10) Compared with Inorganic Fertilizers (Pots 2, 3, 7, 8) and no Fertilizer (Pots 1, 6). The Bottom Series was Limed.

Comprehensive experiments conducted in Florida demonstrated that greatly increased yields were obtained from comparatively large annual applications of fertilizer. The recommendations for that State include the use of a 5-6-5 mixture for young trees, given at the rate of 3 to 4 oz. per month, and for mature trees up to 1½ lb. of a 4-8-8 mixture per month during the growing season.

In North Queensland, results of trials with potted seedlings, which were conducted with young seedling papaw plants up to 15 weeks after germination, indicated that favourable growth response was obtained from the use of organic fertilizers, particularly dried blood. The growth increase for plants receiving organic fertilizers, as determined by stem height, was measurably greater than was the case where an equivalent amount of nitrogen was supplied as sulphate of ammonia. This is shown in Plate 7, where pots 4 and 5, in an unlimed series, and pots 9 and 10 in a limed series, received organic manures.

VALUE OF LIME.

Plate 72 illustrates the effect of liming on the root development of young papaw seedlings grown in pots. A more vigorous fibrous root system was developed in all plants receiving lime. There was no general significant increase in stem height due to lime in this experiment. In this pot trial plants receiving no lime showed chlorotic symptoms and dropped their lower leaves prematurely, leaving an "umbrella" top as seen in Plate 71 (Nos. 1 and 5 were unlimed and Nos. 6 and 10 were limed). This experiment was conducted at South Johnstone, North Queensland, on silty alluvial loam with pH of 4·7 to 5.7.

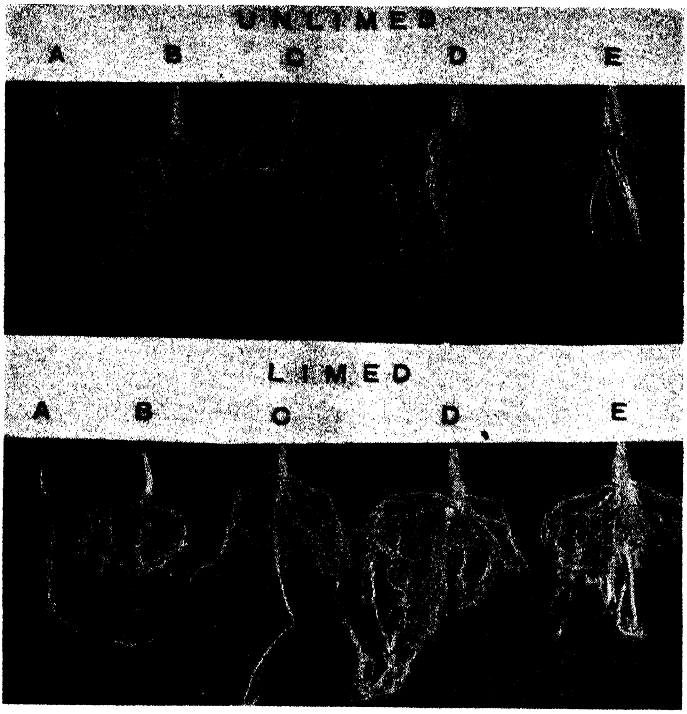


Plate 72.
Showing the Effect of Liming on Root Development of Papaws.

In a pot experiment with Nambour sandy loam more than 100 per cent. increase in height during the first 21 weeks was obtained by the application of hydrated lime at the rate of 4 tons per acre.

GENERAL FERTILIZER RECOMMENDATIONS FOR QUEENSLAND.

Although much information remains to be obtained by experiment under varied soil conditions in order to put forward recommendations which will suit each of the diverse soils on which papaws are grown, it is considered that the following measures will prove satisfactory in most instances.

An 8-12-6 mixture applied at the following rates per tree:—

(1) 4 oz. for trees up to 3 months old;
(2) 12 oz. for trees up to 6 months old;
(3) 2 to 3 lb. for trees 1 years old and upwards.

Fertilizer should be applied in three or four applications during the growing and blossoming period in September, November, and February, with a light application in April. On depleted soils a basal dressing at time of planting is to be recommended. Hydrated lime as an initial application, broadcast at the rate of 3 to 4 tons per acre, should be beneficial, particularly on soils registering below 5·5 on the pH scale.

Plate 73.
A YOUNG PAPAW TREE IN CROP, GUNALDA DISTRICT.

Lime, applied about three months in advance, combined with a legume cover crop before planting the trees, will assist in restoring fertility in many so-called "worn-out" coastal orchard lands, which it is intended to plant with papaws.

CULTIVATION.

The manner and method of cultivation of papaw plantations vary considerably with the type of plantation. Many of these are so steep and rocky that anything other than hand cultivation is precluded. The distance of plant spacing will also influence the method of cultivation employed. Owing to the shallow-rooting habit, it is impossible to do more than stir the first 3 or 4 inches without doing considerable injury to the roots. It is imperative, however, that weeds be suppressed, particularly during the dry spring and early summer months. Papaws respond well to mulching with dry grass hay, cowpea hay or other litter. The mulch cover, besides retarding surface evaporation, also helps to suppress weed growth and is a constant supply of decomposing organic matter, slowly building up the humus content of the soil.

PAPAWS FOR CANNING.

Canned papaw, either as diced papaw or as an ingredient in canned fruit salad, has become a product for which there is an increasing demand. Plantations situated close to canneries, principally in the Brisbane district, have been the main sources of supply.

The best fruit type for canning is oval in shape with no corrugations, weighs from 3 to 4 lb., and has a firm orange coloured flesh, one inch to one and a-half inches thick.

Papaws for canning should be picked so as to arrive at the cannery in the firm-ripe stage, and they should not carry an excessive amount of blemish due to fruit rots.

As the canned product becomes more popular, and improved varieties are more commonly grown, there will be greater scope for development on this side of the papaw industry.

Plate 74.

A CLONCURRY RIVER CROSSING, NORTH-WESTERN QUEENSLAND.

Deficiency Disorders in Deciduous Fruits.

K. M. WARD, Horticulturist.

THE proper nutrition of fruit trees depends not only on the supply of major mineral elements, such as nitrogen, phosphorus and potassium, but also on the availability of what are known as trace elements, which function in regulating growth processes. Deficiencies in the supply of these trace elements rapidly produce serious effects in deciduous fruit trees, causing suppression of growth, dying back of shoots and branches, and pronounced abnormalities in the fruit. Though certain symptoms of such deficiency disorders may resemble those of diseases caused by fungi, bacteria or viruses, treatment lies not in the application of fungicides but in supplying the required element.

In the Stanthorpe district, where most of Queensland's deciduous fruits are produced, nearly all species of these fruits are affected by deficiency disorders, but it is in apple trees that the troubles are most prevalent. These trees suffer from deficiencies of zinc, copper and boron, and any combination of these disorders may occur in an individual orchard. Pears are affected by zinc and copper deficiencies, whilst stone fruits mainly show a lack of zinc, and a number of varieties of grapes are benefited by applications of boron.

These troubles are known by names which partly describe their symptoms. Thus, zinc deficiency is known as little-leaf, copper deficiency as wither-tip or summer dieback, and boron deficiency in apples as internal cork and measles. These various disorders have been the subject of investigation at Stanthorpe during a period of five years, and it is now possible to present the findings in summarised form and give practical control recommendations. Because of the fact that the troubles can be controlled effectively and cheaply none of them need cause very serious losses in any commercial orchard.

LITTLE-LEAF.

Little-leaf has become increasingly prevalent in Stanthorpe orchards during the last ten years, appearing each year in previously healthy orchards irrespective of their age. The disorder has occurred on all the main local granitic soil types, and though predominantly affecting apple trees it also occurs in pears and stone fruits and is suspected of being present in grape vines. The control of the disorder is therefore of considerable importance to the fruit-growing industry.

Little-leaf is most readily recognised during the months of October and November, when the typical "little-leaf" stage of the disorder (Plate 75) is most plainly shown. This stage is preceded by a delay of as long as two weeks in the leafing-out of the terminal shoots on one or more branches of the tree. When the leaves do appear they usually remain greatly reduced in size, are rigid and narrow, and they develop very slowly, if at all, and thus form a rosette at each bud on the parent wood. This dwarfed condition of the foliage is usually confined to the younger wood on leader and sub-leader branches. Chlorosis or mottling of the small leaves, and also of other nearby foliage, is a common symptom during late spring and summer; such leaves are

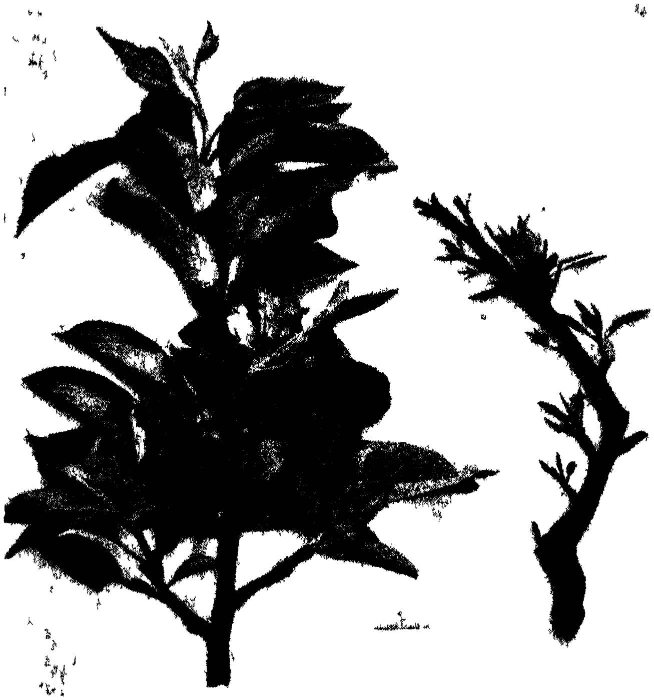


Plate 75.

LITTLE LEAF OF APPLE.—Left, normal spring growth. Right, shoot showing "little-leaf" stage.

yellowish in the areas between the veins, but tissues near the veins remain green. Terminal shoot growth on affected branches is either greatly suppressed or completely lacking (Plate 76).

In the growing season following the appearance of this little-leaf growth the buds on affected shoots may fail altogether to break and thus neither foliation nor shoot elongation takes place. Later these shoots commence to die from the tip and this dieback proceeds downwards into older wood, a characteristic feature of this stage being the clearly defined line of demarcation between dead and living tissues. In the early stages only a few branches of a tree may show symptoms of the disorder, but the whole tree is liable to become affected within a few seasons. Sometimes the trouble is confined to one side of a tree for some years and this results in lopsided development.

Fruit produced on seriously affected trees is dwarfed but otherwise its general appearance is not affected. The cropping capacity of such trees is decreased, owing to the reduction in the amount of fruit-bearing wood.

Treatment.

Experiments have shown that zinc sulphate sprays applied in winter give responses that are more extensive, more rapidly shown and more enduring than foliage sprays or any other treatment. Foliage sprays act more slowly and the effect disappears quickly and treatment

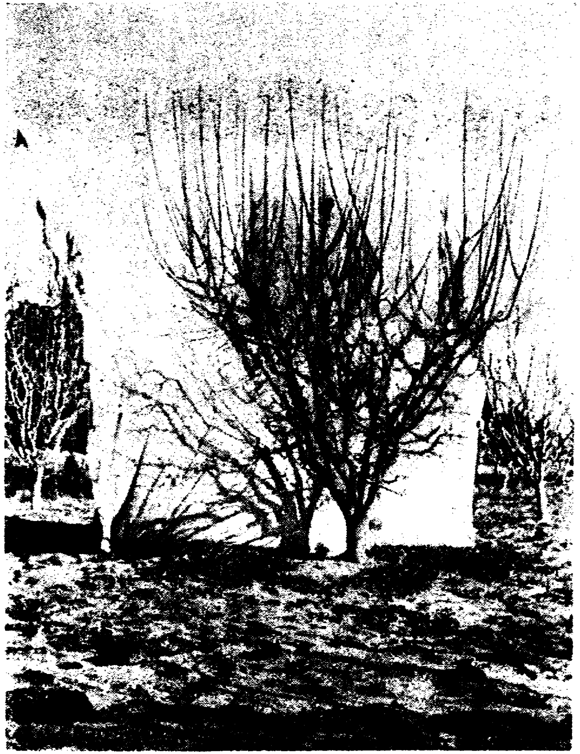


Plate 76.

LITTLE-LEAF OF APPLE.—Tree showing suppression of terminal growth on affected branches.

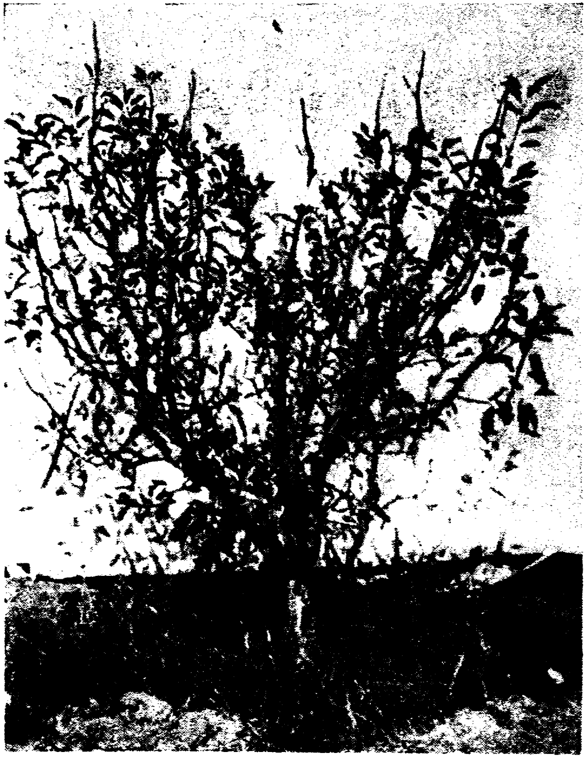


Plate 77.

LITTLE-LEAF OF APPLE.—The tree shown in Plate 76 photographed after restoration to full vigour by winter spray treatment.

by this method would therefore involve an application of spray every year. Initial measures with winter sprays to remedy the little-leaf condition and restore health to zinc deficient trees require the application of zinc sprays in July or early August for two successive years. Each spray should consist of 20 lb of zinc sulphate in 80 gallons of water, but if the trees are severely affected the strength of the first application should be increased to 40 lb. per 80 gallons. After the initial applications in two consecutive years the weaker spray should be applied in alternate years to maintain a supply of zinc to the trees (Plate 77).

It is preferable to apply the winter spray before pruning, but if this is impracticable the application should be delayed for at least two weeks after pruning in order to avoid any injury that may result from the entry of the spray solution through the newly-cut wood (Plate 78).

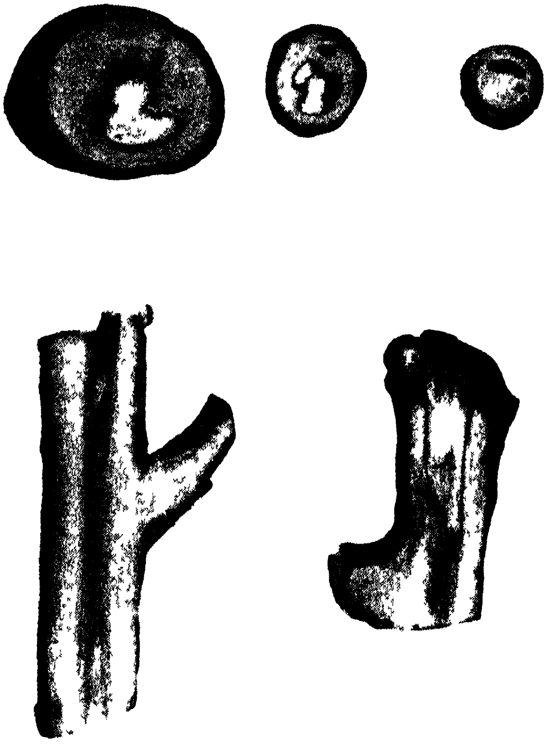


Plate 78.

LITTLE-LEAF OF APPLE.—Sections through branches in which wood tissue was killed by spraying immediately after pruning.

WITHER-TIP OR SUMMER DIEBACK.

For a number of years the cause of the dying back and withering of the tips of the current season's shoots, mainly on apple trees, was unknown; but it was eventually observed that affected trees sprayed with Bordeaux mixture in late spring recovered from the trouble in the following year. Subsequent investigation has proved that the condition can be controlled by supplying the trees with copper and it has been concluded that the disorder is due to the unavailability of this element.

Wither-tip is rather widespread in the Stanthorpe district, where it affects all varieties of apples whether they are young trees just established on newly-prepared land or old trees past their prime. Occasionally the disorder occurs on pear trees, but it has not, as yet, been observed to affect stone fruit trees. In South Africa, however, plums, peaches, and apricots growing on certain sandy soils have exhibited the yellowing of the leaves and serious rosetting, the formation of multiple buds, the dying back of branches and a sharp decline in yield, and this condition, known as exanthema, has been attributed to copper deficiency. Furthermore, treatment of exanthema in plums and other fruits with copper sulphate has been described from Western Australia and elsewhere, so that it is possible that similar trouble may be found on stone fruits in this State at some future date. The first outward symptoms of wither-tip are to be seen towards the end of

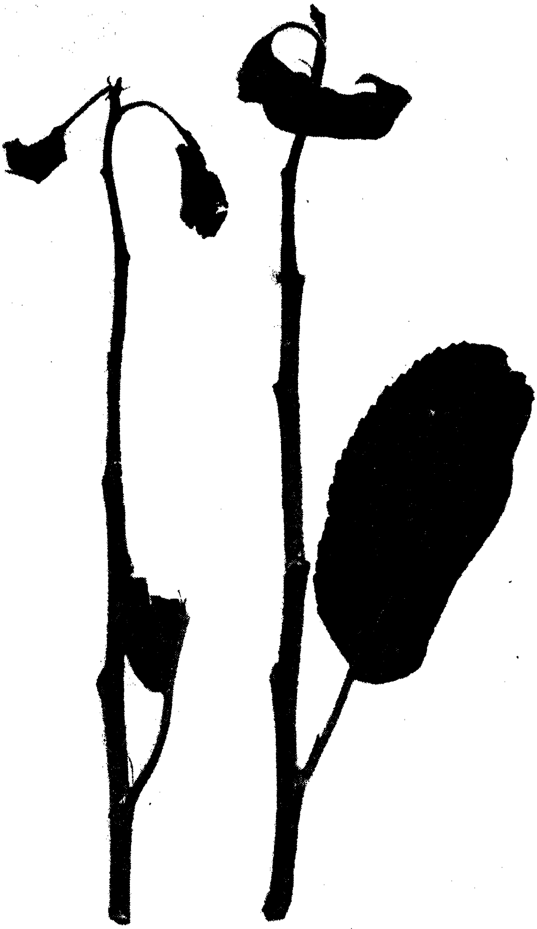


Plate 79.

WITHER-TIP OF APPLE.—Second stage of the disorder, showing dead leaves and defoliation.

spring when the apical growth on the current season's shoots stops and takes on an unhealthy appearance. Young, partly grown leaves and the older leaves near each tip next begin to show brown areas in which the tissues soon die (Plate 79). These dead and dying areas usually take the form of large, irregularly-shaped, brown blotches, but in the Delicious variety they begin as numerous small reddish patches which soon die, leaving many small blotches about ⅛ inch in diameter, somewhat like a stage of shothole disease in stone fruit leaves. The occurrence of these dead patches is soon followed by the death of the leaves, which then fall, and thus the shoot becomes defoliated for upwards of 9 inches from its tip. This portion of the shoot wilts, dies, and withers, and becomes characteristically curved to one side (Plate 80). If this stage is reached early in the season, new twig growth arises from live buds lower down the shoot (Plate 81), and these in turn become affected before the end of the season.

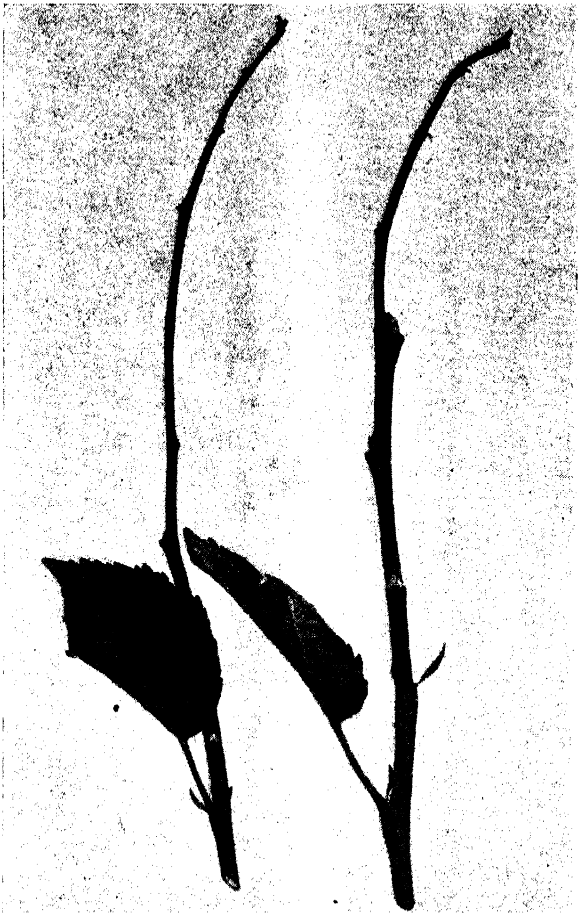


Plate 80.

WITHER-TIP OF APPLE.—Final stage of the disorder, showing the tips withered, curved, and completely defoliated.

This disorder, unlike little-leaf, is not confined to the terminal shoots of leader branches, for although it is conspicuous in top growth it also develops on young shoots in any other part of the tree. The total effect is to cause a marked suppression of growth and a general loss of vigour (Plate 82).

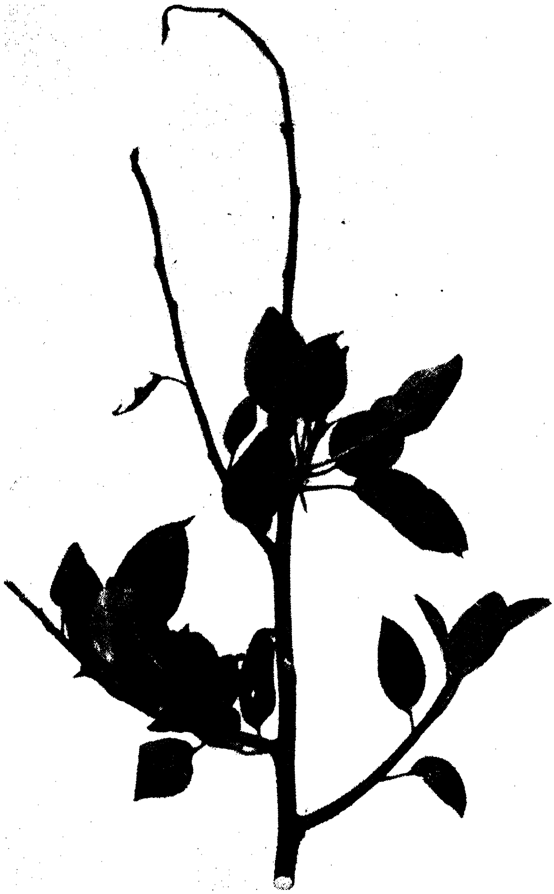


Plate 81.

WITHER-TIP OF APPLE.—Showing secondary twig growth which has in turn become affected.

Associated invariably with this wither-tip condition is a typical roughening or scurfiness of the bark on wood that is one or more years old. This scurfiness, which is due to the presence of numerous fine cracks in the bark, does not extend to the underlying wood, but it may cover the greater part of a young tree down to ground level (Plate 83). In the absence of treatment the cracks deepen and the roughness becomes more coarse and flaky. Fruit characters do not appear to be affected by this disorder. Pears exhibit symptoms similar to those of apples.

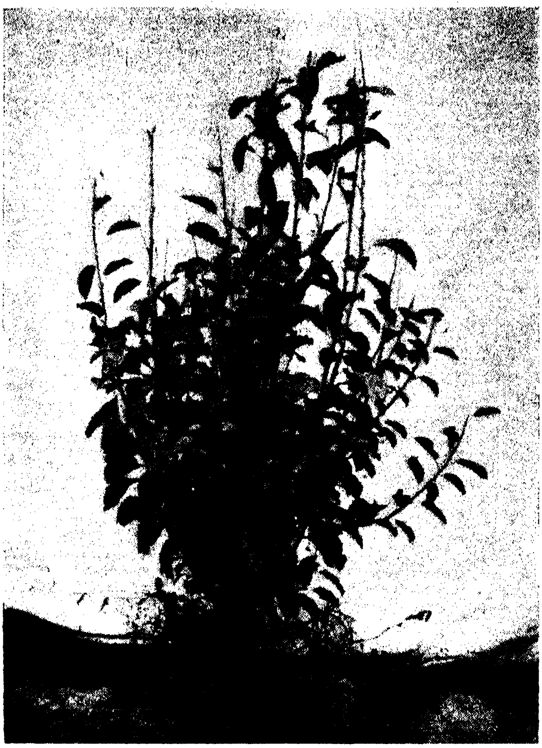


Plate 82.
WITHER-TIP OF APPLE.—Young affected tree in which top growth has been severely suppressed.

Plate 83.
WITHER-TIP OF APPLE.—Showing scurfiness of bark on young tree.

Treatment.

It has been found in local experiments that wither-tip can be quite satisfactorily controlled by supplying copper to affected trees. The method of treatment may be varied according to the age of the trees. Young non-bearing trees respond very well to a 4:4:40 Bordeaux spray applied in late spring, and the benefits from a single application may last several years. This method of application is not advisable for bearing trees because the spray is likely to cause russetting of the fruit.

A preferable treatment for both bearing and non-bearing trees is a soil application of ¼ to ½ lb. per tree of fine copper sulphate crystals, i.e., "bluestone". This material should be broadcast evenly over a large area around each tree and ploughed in late in winter. The copper thus applied usually becomes available to the trees in time to cure wither-tip in the following spring and summer; trees receiving this treatment in experimental work have so far remained free from the trouble for five years. It is advisable to avoid using the large bluestone crystals employed in the preparation of spray mixtures, for such material when applied to the soil may give rise to such localised concentrations of copper sulphate within the root zone as to cause root injury; the fine crystals are available and inexpensive.

Among other methods of treatment tested is the spraying of the trees in winter with Bordeaux at a strength of 6:4:40. The evidence obtained in experimental work clearly indicated that such winter spraying was not effective for the control of wither-tip.

BORON DEFICIENCY DISORDERS.

From time to time apple fruits become affected by several related disorders which are due to boron deficiency. Of these, internal cork is the most common, but corky-core and superficial cork, or drought spot, also occur. These troubles produce serious defects in the fruit, but fortunately they are not very prevalent in Stanthorpe orchards and occur rather spasmodically, though orchards in which they appear are widely scattered in the district. Internal cork, for example, may develop one year, and without treatment may make no further appearance for several ensuing years. However, it is all too evident that boron deficiency arises in Stanthorpe soils, and fruit trees, therefore, require treatment from time to time.

INTERNAL CORK.

Boron deficiency symptoms in apple fruits vary in different varieties, the most striking effects being shown by the Granny Smith. At the earliest stage in the development of symptoms, greenish-coloured areas appear in the flesh of the fruit; when near the surface, such areas may be visible through the skin. Later these patches become brown and spongy or corky, thus giving the typical appearance of internal cork; they usually lie scattered throughout the flesh. The Granny Smith is also very subject to malformation, notably to surface dimpling or knobbiness which is associated with the internal corky lesions. If the apples become malformed when still quite small they do not grow much more, but remain seriously mis-shapen and stunted. Many of them fall from the tree before ripening.

CORKY CORE.

The corky core form of boron deficiency occurs notably in Jonathan and McIntosh and is evident as corky brown lesions in the core region only. Dimpling of the surface and other malformations have not been observed in these varieties, affected fruits retaining their normal appearance externally. Fruits of the Delicious variety have not exhibited any form of internal cork though they sometimes show dimpling in a mild form.

SUPERFICIAL CORK OR DROUGHT SPOT.

Superficial cork or drought spot, which often appears early in the life of the fruit, at first occurs as a russetting or brownish wrinkling accompanied by slight cracking in patches on the skin. As the condition develops these patches become roughened, the cracks deepen, and areas of skin become dark-brown. In the final stage, very deep and wide cracks appear extending perhaps up to one-third or more of the distance around the fruit, resulting in severe malformation. Fruit affected early in its life remains dwarfed. No internal browning appears to be associated with this form of boron deficiency. This type of cork has been observed on Jonathan and Delicious, and its occurrence on Dunn and other varieties is suspected

In New Zealand a brown spotting in the flesh of apricots, particularly in the region near the stone and, in mild cases, largely confined to the stem end, has been found to be due to boron deficiency. Dropping of fruit is also associated with the condition. This trouble has not been observed in the Stanthorpe district, but if symptoms similar to those described should appear in apricots here a form of internal cork might well be suspected

MEASLES.

In recent years, a disorder which is attributed to boron deficiency and which affects particularly the bark of Delicious and Jonathan trees has been observed in a number of orchards This condition, which is known as measles, is characterised by the development of innumerable pimples or blisters on the bark of the tree (Plate 84). These first appear on the youngest wood during autumn and winter each year. In the following year the pimples enlarge and the bark cracks and becomes very coarse (Plate 85); the affected areas may merge into each other. The bark near such areas is usually reddish in colour and red streaks may occur in the wood. This condition may affect one or more branches on a tree and invariably it causes stunting

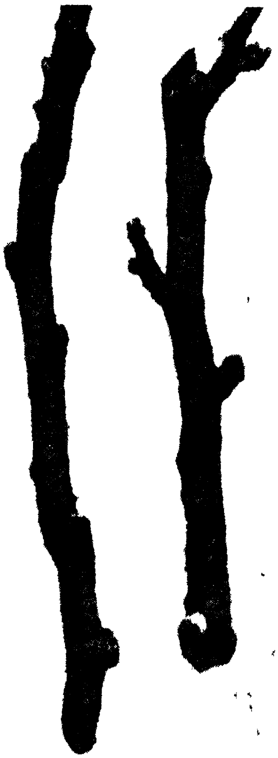


Plate 84.

Measles of Apple.—Showing pimple stage of disorder.

of growth, usually to a serious extent. Foliage on affected branches does not appear to develop any characteristic symptoms of distress. The fruit, however, on some affected trees has produced well-marked symptoms of superficial cork, whilst on others the only symptom that might be associated with the condition is an abnormal amount of dimpling in Delicious

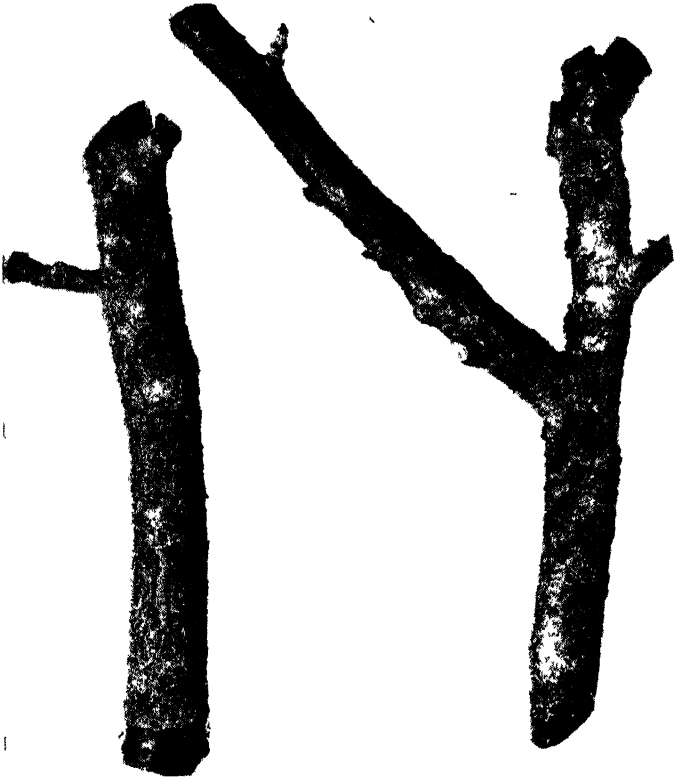


Plate 85.

MEASLES OF APPLE.—Showing coarse cracked bark and stunting of growth.

"HEN AND CHICKENS" IN GRAPES.

Some varieties of grapes in the Stanthorpe district are rather seriously affected by a condition commonly known as "hen and chickens," in which part or the whole of a bunch may consist of seedless berries too small for use as table grapes (Plate 86). Among the varieties chiefly affected by this trouble are Waltham Cross (Rosaki), Muscat and Henab Turki, which too often produce non-commercial crops because of it. Experiments have demonstrated that, under Stanthorpe conditions, treatment with borax usually reduces the incidence of "hen and chickens" to negligible proportions.

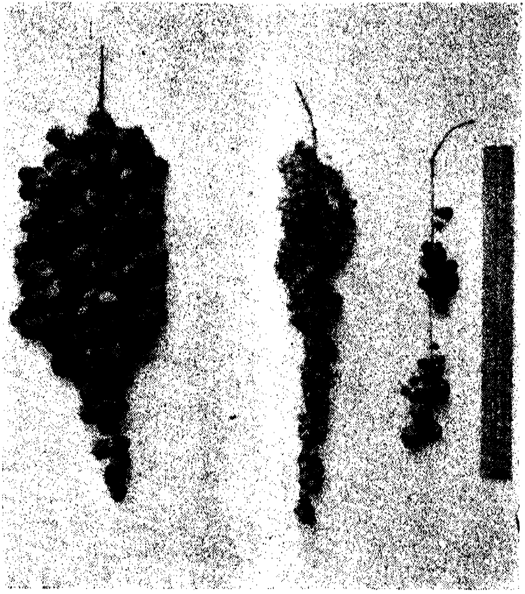


Plate 86.
"HEN AND CHICKENS" OF GRAPES.—Two bunches of Henab Turki on right affected by "hen and chickens." Bunch on left from vine treated with borax.

TREATMENT OF BORON DEFICIENCY DISORDERS.

The cork diseases described herein respond satisfactorily to treatment with borax applied either through the soil or as a foliage spray. Soil applications at the rate of ½ lb. of borax per large sized tree, or half this amount for a small or immature tree, should be ploughed in during late winter or early spring; such treatment is usually effective in the ensuing growing season. Care must be taken, however, to broadcast the material widely and evenly around each tree, and in order to achieve this it is advisable to mix the borax thoroughly with several times its own volume of dry sand or fine soil. Concentrations of borax in the root zone caused either by careless application or by placing it in a trench or furrow near the tree must be avoided, for it has been found that, under local soil conditions, borax rapidly becomes available to plants, and slightly excess quantities produce serious toxic effects. A large tree, for instance, can be injured by 1 lb. of borax, and it is therefore important that stipulated amounts should not be exceeded in any soil dressings. A soil application will remain effective for several years, and for this reason the treatment is preferable to any other.

If it is necessary to use foliage sprays they should consist of ½ per cent. borax solution, or 4 lb. borax in 80 gallons of water; a single application made during November will prevent the development of cork during that season, and possibly a little longer. Boric acid can be substituted for borax at the rate of 3 lb. per 80 gallons. Both soil and spraying treatments are applicable also to trees affected with measles.

Summary of Recommendations for the Control of Deficiency Disorders in Deciduous Fruits.

Name of Disorder.	Deficient Element.	Method of Control and Material Used.	Time of Application.
Little-Leaf	Zinc	Zinc sulphate spray, 20 lb. per 80 gall. Applied two years in succession, thereafter in alternate years. Double strength in first year in severe cases	July—early August
Wither-Tip or Summer Dieback	Copper	Copper sulphate in soil ½ lb. per tree .. or On non-bearing trees 4 : 4 : 40 Bordeaux	Late winter—early spring November
Internal Cork .. Corky Core .. Superficial Cork or Drought Spot	Boron	Borax soil application ¼ to ½ lb. per tree	Late winter—early spring
Measles..	Probably Boron	Borax spray, 4 lb. per 80 gall. ..	November
"Hen and Chickens" in Grapes	Probably Boron	Borax soil application 2 ounces per vine or Borax spray, 4 lb. per 80 gall. ..	Late winter—early spring 2 to 3 weeks before blossoming

Grape vines subject to the "hen and chicken" condition also respond equally well to a soil application of borax or a foliage spray applied at the correct time. In the case of the soil treatment each vine should receive two ounces of borax widely broadcast and cultivated in during late winter or early spring. Here again it is important that the dressing be evenly distributed around each vine and for this purpose borax should be mixed with dry sand. A soil application has been known to remain effective for three years on Waltham Cross grapes, and after that period reversion to "hen and chickens" has taken place. Spraying with ½ per cent. borax solution is effective if applied three weeks before flowering. However, the full effects of this treatment are felt only in the following growing season and reversion to "hen and chickens" may occur in the next year unless the application is repeated.

SPRAY COMBINATIONS.

The fact that it is necessary to use various trace elements in sprays in order to control deficiency disorders in deciduous fruits has given rise to many enquiries concerning the possibility of combining these materials with insecticides and fungicides applied as sprays. Generally speaking, the number of such combinations which function efficiently is rather limited, for it is not often that such a mixture, applied for a dual or triple purpose, will exert its full effect on each of the troubles with which it is desired to deal. This is largely because the correct timing of spray applications usually plays such an important part in pest and disease control. Then again, the safety or otherwise of some combinations under different seasonal conditions, and prepared with water obtained from different sources, is not always predictable. In the light of the recommendations given in this article for the control of deficiency disorders it will be seen that there are not many opportunities to use such combined sprays; for little-leaf is best controlled by a winter spray applied somewhat earlier than the winter pest-control sprays whilst wither-tip and boron troubles are most suitably dealt with by soil treatment.

Considerations of cost or availability of materials may sometimes make the use of alternative methods of treatment necessary or desirable, and information on potential spray combinations is then useful. The effectiveness of zinc sulphate in controlling little-leaf is not impaired when it is combined with winter strength lime sulphur, and the mixture of these substances is not injurious to the trees. The mixing of these two, however, results in the formation of a heavy precipitate in the spray vat and therefore the combination may be inconvenient to use. When oil emulsions and zinc sulphate are mixed, a reaction occurs which results in the probable destruction of some of the insecticidal properties of the oil. If it is desired to use a winter oil spray it is sound practice to avoid spraying the trees just prior to the application of zinc sulphate as the oil then tends to prevent the zinc spray from adhering to the bark, and also from penetrating the plant tissues. It is preferable therefore to apply the zinc sulphate in, say, early July and the winter oil a month later. Zinc foliage sprays are not recommended for little-leaf control and therefore their combination with summer spray materials need not become a problem.

Bordeaux mixture for application in November to control wither-tip can safely be combined with arsenate of lead, white oil or nicotine sulphate, but not with lime sulphur. On apple and pear trees ½ per cent. borax solution has been combined with standard arsenate of lead sprays without causing injury to the trees.

QUEENSLAND SHOW DATES.

Queensland Agricultural Show Societies are quickly moving again into active organization, and appended is a list of show dates, registered up to 10th January by the Queensland Chamber of Agricultural Societies, for 1946:—

APRIL.

Mount Perry	27th
Nanango	26th and 27th
Roma	30th, and 1st and 2nd May

MAY.

Monto	1st and 2nd
Kingaroy	1st, 2nd, and 3rd
Eidsvold	6th and 7th
Murgon	9th, 10th, and 11th
Beaudesert	8th and 9th (Camp Draft 10th and 11th)
Kilkivan	17th and 18th
Esk	17th and 18th
Gympie	22nd and 23rd
Biloela	23rd and 24th
Laidley	24th and 25th
Blackbutt	24th and 25th

JUNE.

Kalbar	1st
Boonah	7th and 8th
Childers	10th and 11th
Lowood	14th, 15th, and 17th
Gin Gin	17th and 18th
Rockhampton	19th to 22nd
Mackay	24th to 27th
Toogoolawah	28th and 29th

JULY.

Proserpine	5th and 6th
Rosewood	12th and 13th
Gatton	19th and 20th
Cairns	23rd, 24th, and 25th
Yarraman	26th and 27th
Ipswich	30th and 31st, and 1st and 2nd August

AUGUST.

Lawnton	2nd and 3rd
R.N.A.	12th to 17th

SEPTEMBER.

Canungra	7th
Beenleigh	20th and 21st

OCTOBER.

Nerang	4th and 5th

LANT PROTECTIO

The Fruit Spotting Bug.

W. J. S. SLOAN, Agronomist.*

THOUGH the fruit spotting bug† feeds on many plants, it is best known as a pest of the papaw in coastal districts of central and north Queensland. The insect has also been recorded further south though seldom in sufficient numbers to injure the plants on which it feeds. Papaw plantations located near standing scrub are particularly susceptible to attacks, as are also trees in home gardens of coastal towns. In addition to the papaw, host plants of the bug include passion fruit, granadilla, banana, custard apple, mango, pineapple, cassava, beans of various types, frangipanni, Peltophorum and some native trees such as white cedar and the rough leaved fig.

Injury.

Papaw trees of all ages are attacked by both immature and adult bugs, but injury is most severe on those that are less than nine months old. The damage to the growing tip is particularly serious, but green and ripe fruits may also be injured. Sap exudes from the feeding punctures and small lumps of congealed latex on the growing tip are usually an early symptom of infestation. The plant tissue at each puncture becomes depressed and cracks later appear on the injured stem or leaf stalk. Cracks in the leaf stalk may develop into splits up to 4 inches in length; cracks in the main stem may be ¼ inch deep.

Injury in seedling papaws is sometimes fatal if the plants are neglected, but older trees survive even heavy and prolonged attacks. Where the terminal is killed, side shoots are usually formed and these may develop normally if they are not infested (Plate 87). Moderately injured terminals will recover if growing conditions are good and the bug population declines. When trees are shaded and bug populations are high, the growth of sooty mould fungi on the congealed latex at or near the bug punctures makes the stem and leaf stalks seem dirty and unthrifty. The appearance of papaw trees in which the growing tips have been injured is very characteristic for the terminal growth consists of a dense bunch of leaves with short, distorted stalks (Plate 88). The bunching effect is due to the suppression of normal growth and the internodes are consequently very short. The bug does not appear to seriously affect trees once flowering has begun, but attacks on the young papaws may delay the commencement of flowering. Some shedding of fruit occurs on weak trees, but, in general, setting is not affected. In this respect,

---

* **Formerly an officer of the Science Branch.**

† ***Amblypelta lutescens*** **Dist.**

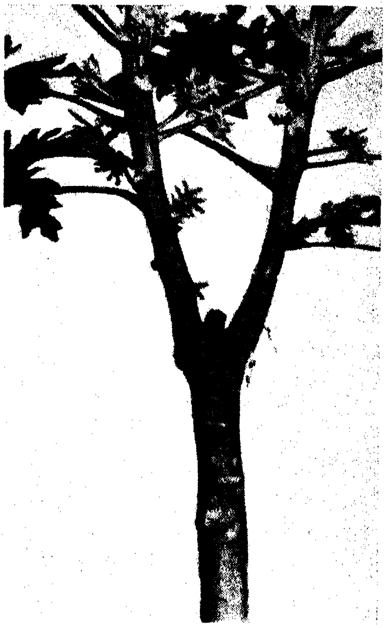


Plate 87.

YOUNG PAPAW TREE WITH TWO HEALTHY SIDE SHOOTS FORMED AFTER THE ORIGINAL TERMINAL HAD BEEN DESTROYED.

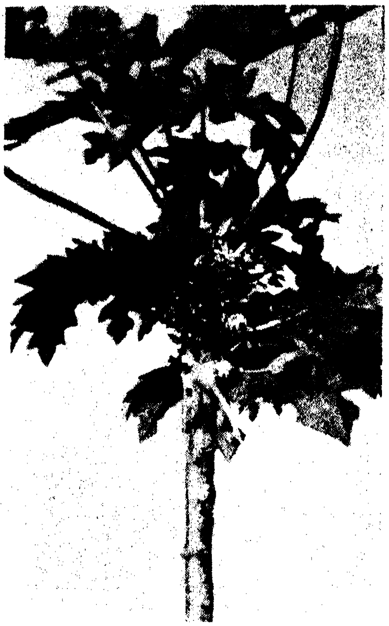


Plate 88.

YOUNG PAPAW TREE SHOWING BUNCHED TERMINAL GROWTH WITH STUNTED LEAVES AND LEAF STALKS.—Normal stem and leaf growth has been resumed following removal of fruit spotting bugs by handpicking.

the fruit spotting bug on papaws differs markedly from a related species* attacking coconuts in the Solomon Islands. Vigorous, bearing trees apparently tolerate comparatively high bug populations without displaying marked abnormalities in growth. When papaw fruit are attacked by the fruit spotting bug, each feeding puncture is marked by a depressed lesion $\frac{1}{8}$ inch or more in diameter and dark-brown in colour.

On cassava and frangipanni, injury to the vegetative growth is similar to that already described on the papaw. On custard apple, granadilla, banana, passion fruit, pineapple, beans and mango, abnormalities in growth are less common and spotting of the fruit is more characteristic of the damage.

A small population of adult and immature bugs can cause injury to the host plant; one or two bugs on each papaw tree are often sufficient to stunt and distort the growing points within a month after the commencement of an attack. The severe reaction of the trees to such bug populations cannot very well be explained by the mechanical destruction of plant tissue during feeding. It seems probable, therefore, that plant toxins are introduced into the trees as the insects feed and that these produce the gross symptoms of injury recorded in the plantation. Immature bugs appear to be more injurious than adults, probably because the former are confined to one tree until they mature whereas adults may fly from tree to tree and feed on each for a short time only.

---

* *Amblypelta cocophaga* China.

Life History and Habits.

The eggs of the fruit spotting bug are pale-green in colour, oblong shaped with rounded ends, roughly triangular in cross section and approximately one-sixteenth of an inch in length. They are normally laid singly on papaw leaves, more particularly the older leaves, but occasionally they may be laid elsewhere, as, for example, on the trellis posts of passion fruit vines. The eggs hatch after an incubation period of four to six days during warm weather. The immature bugs emerging from the eggs are very similar to the adults in shape, though they are much smaller and lack wings. They are invariably red to reddish-brown in colour in the later stages of development, with two prominent dark-red spots on the back of the abdomen. The four-segmented antennae are long with the third segment somewhat flattened and dark-brown in colour. During summer, a period of from four to six weeks elapses after the hatching of the eggs before the bugs reach the adult stage. The immature bugs move slowly, and are conspicuous on the papaws because of their bright colour. They feed principally on the young leaves in the tender growing point of the tree, where they remain until the adult stage is reached. The adults (Plate 89) are slender winged insects about ½ inch in length and approximately ⅛ inch across the body. They are pale, yellowish-green in colour, sometimes with a brownish tinge, and they are consequently difficult to detect in the green foliage of papaws. Like the immature stages, they are generally found in the young growth among which they move freely on sunny days and readily take to flight when disturbed. Under cool conditions, they are rather sluggish and can be caught fairly easily in the early morning. The adult bugs may live for at least four weeks during the summer months.

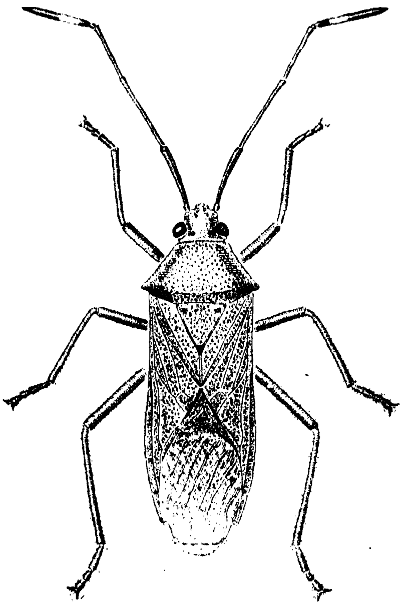


Plate 89.

Fruit Spotting Bug.—Adult x 4.

[Drawing by William Manley.

Fruit spotting bugs have been found on papaw trees growing in coastal areas of central Queensland throughout the year, but populations vary a great deal from month to month. They are usually most numerous in the autumn, but severe outbreaks may be encountered at any time, other than the cool winter months when activity is normally slight. Bug populations in papaw plantations temporarily fall to very low levels after cyclonic rains during the summer. On established papaws, which have experienced bug attacks, the seasonal activity of the pest is clearly indicated by the occurrence of feeding scars and the presence of swollen areas with short internodes on the stem (Plate 90).

Control.

Papaw plantations are never uniformly infested by the fruit spotting bug and some trees appear to remain free from the pest throughout the year. A number may also react less severely to infestation than others in the same plantation; most papaws, however, are tolerant to the pest if they have been planted nine months or more, provided they have made good growth and are well cultivated. On the other hand, in gardens where only a few trees are growing, severe injury may occur on older papaws, particularly if they are close to other host plants of the fruit spotting bug.

Since the age and vigour of the papaw seem to determine its susceptibility to injury, good growing conditions should be maintained in the seed-bed and for at least nine months after the seedlings have been set out. It is advisable also to select seed from trees which, in addition to other desirable characteristics, show little or no bug injury. Where possible, papaw plantations should be located at least one-half mile away from areas of standing scrub which may act as sources of infestation.

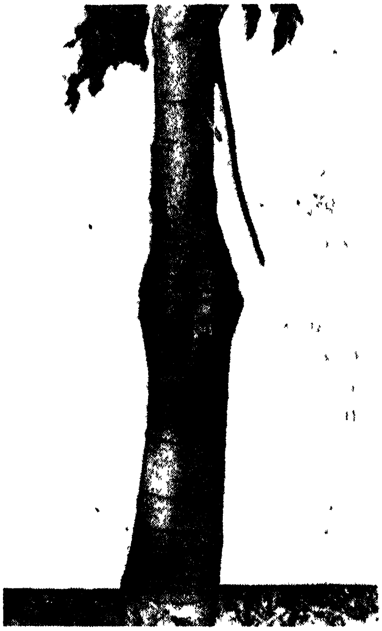


Plate 90.

TRUNK OF PAPAW TREE, THE TERMINAL OF WHICH HAD BEEN INJURED, BUT NOT KILLED, BY THE FRUIT SPOTTING BUG.—The swollen portion of the stem with short internodes and scars indicates the height of the plant when attacked.

Hand-picking the bugs is a moderately effective and reliable method of protecting trees until they are old enough to tolerate injury under good growing conditions. Once the grower becomes familiar with the habits and appearance of the pest, the trees can be hand-picked rapidly, for the small lumps of latex at new feeding punctures and the distortion of young leaves in the terminal are easily distinguishable signs of injury. When moving along the rows, a glance at the terminal is sufficient to indicate whether the pest is active or not. Where bunches of distorted leaves have appeared on infested trees, sufficient of these leaves should be stripped away from the terminal to facilitate examination. Weekly inspections of the plantation should be made throughout the year, except during late summer and autumn when the trees may require examination twice each week, at least in those areas where previous experience has shown the pest to be active. These inspections are most efficiently carried out in the early morning when the insects are comparatively sluggish and can be easily collected. Seed-beds may also be protected by regular handpicking.

During routine inspections of the plantation, the tops of any seriously injured trees should be removed with a slanting cut made by a sharp knife. Strong shoots will then grow from the stem and one of these may be retained and, in common with the rest of the plantation, regularly examined and kept free from the pest. Such drastic treatment is not required in trees with lightly injured terminals for they normally recover when control measures are applied.

Should the grower prefer to use insecticides for the control of the fruit spotting bug, he may apply dusts containing nicotine or pyrethrum. Fortnightly applications of a 5 per cent. nicotine dust or a dust containing equal parts of ground pyrethrum flowers and kaolin have shown considerable promise in preliminary field trials. Both can be applied fairly easily with a knapsack plunge duster during the warmer part of the day. It is probable that sprays and dusts containing D.D.T. will also be useful for controlling the pest.

◆

ANSWERS.

(Selected from the outgoing mail of the Government Botanist.)

Hibiscus. Ragweed.

C.J.C. (Acland)—

1. The plant with the poppy-like flower is the annual hibiscus or bladder ketmia (*Hibiscus trionum*). This plant is a very common weed particularly on black soil country on the Darling Downs and in Central Queensland. It is not a particularly aggressive weed and is not known to possess any poisonous or harmful properties at any stage of its growth.
2. It is difficult to be certain of weeds in the absence of seed heads but there is no doubt this is the Perennial ragweed (*Ambrosia psilostachya*). This plant is very difficult to eradicate because any of the underground portions when cut with a spade or plough is capable of forming a fresh plant. In small areas, constantly cutting and keeping down the green shoots so that they cannot nourish the underground parts is the most satisfactory method of dealing with it. In large areas, the plant can be treated with arsenical sprays, but several sprayings may be necessary before satisfactory results are achieved. The plant is a bad pest in some parts of New South Wales and South Australia, where sodium chlorate applied in a 10 per cent. solution—*i.e.*, about 1 lb. to a gallon of water—has been found more satisfactory than arsenical sprays, particularly if applied about September.

Gambia Pea.

J.A.B. (North Arm)—

The specimen is the Gambia Pea (*Crotalaria gorensis*). This pea has been grown to some extent in Queensland as a green manure and is one of the best for the purpose. It has been planted fairly extensively on some of the sugar lands. The genus *Crotalaria* is a large one and some of the species both here and abroad have been proved poisonous to stock. So far as tests go, however, this one seems to be quite harmless though there is just a shade of suspicion about any of the group.

Cape Cotton.

F.A. (Clifton)—

The specimen is the white cotton or Cape cotton (*Asclepias fruticosa*). This plant is widely spread in the coastal areas of the State and though ornamental becomes rather a pest on coastal farms. It is particularly abundant in cleared scrub country. Feeding tests have proved it to be poisonous to stock, but is rarely eaten by them to any great extent. The bark produces rather a strong fibre, but the silky cotton surrounding the seeds has no textile value. It may, however, be used as a substitute for kapok. In the United States these various silky cottons are collected as substitutes for kapok.

Milk Spoilage by the Can.

V. R. SMYTHE, Dairy Research Branch, Division of Dairying.

IT is surprising how many dairymen are prepared to accept cans, in the condition in which they are returned from the depot, as being clean enough to contain milk. Often the only treatment they receive, before being filled with milk, is a perfunctory rinse. It is this lack of understanding which leads to one of the main causes of milk deterioration. Experience has shown that cans returned to the farmer vary widely in their cleanliness. Those which have had water residues left in them are by far the worst, but even a dry can may be stale smelling.

Recently, some tests were carried out on the deterioration which fresh milk suffers as a result of being transported in cans to the depots. The results of these tests are set out as a summary in the following table:—

Percentage of all Samples Tested.	Amount of Spoilage (Fall in Methylene Blue Test in Hours).
4·6	0
11·0	¼
12·9	½
17·4	¾
12·8	1
14·7	1¼
11·0	1½
3·7	1¾
4·6	2
2·8	2¼
1·8	2½
·9	3
·9	3½
·9	3¾
100·0	

These tests were conducted in such a way that the amount of spoilage which each milk suffered resulted from the milk can. It will be seen that only 4·6 per cent. of the milks showed no spoilage. The other 95·4 per cent. showed spoilage equivalent to a shortening in the methylene blue test ranging from ¼ hour to 3¾ hours. The fact that over 50 per cent. of samples showed a shortening of more than 1 hour in the test demonstrates clearly that contamination from the can is too serious a factor to be ignored.

It was also found that the amount of milk spoilage is increased when the temperature of the milk is raised, and also when the period of transport is increased.

It is easy to see how a badly cleansed and sterilised can may contaminate and spoil milk when it is considered that the milk is in contact with the can surface for the whole of the period from farm to depot. During this time the can is lidded down and agitated by the jolting of the truck. Old cans which are pitted, cracked, or rusted present an additional menace in that the broken and uneven surfaces form a harbour in which milk-spoiling bacteria may lurk.

It is recommended that cans and lids be treated in the following way immediately on return from the depot:—

(1) Rinse out with cold or luke warm water.

(2) Scrub with hot water containing 1 cup of washing soda or 1 tablespoon of caustic soda to 4 gallons.

(3) Rinse with clean boiling water.

(4) Scald with boiling water.

(5) Up-end to drain and dry.

Immediately before the cans and lids are used they should be examined, and if they are not clean smelling the procedure outlined above should be repeated. Finally, cans and lids should be rinsed with a chlorine solution. This solution can afterwards be used for washing milkers' hands and cows' teats and udders.

◆

WHAT IS AN ACRE ?

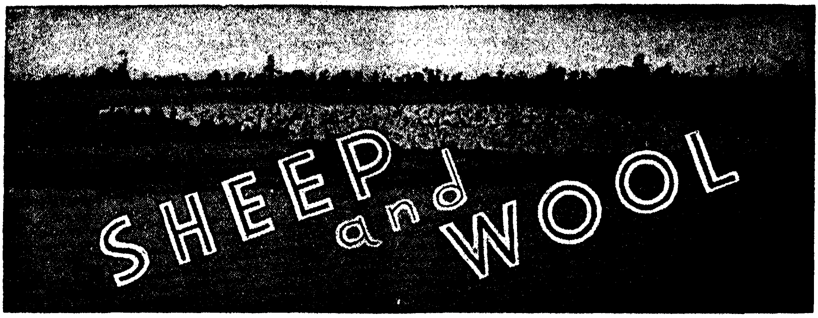
5 yards by 968 yards .. .. contains 1 acre.
10 yards by 484 yards .. .. contains 1 acre.
20 yards by 242 yards .. .. contains 1 acre.
40 yards by 120 yards .. .. contains 1 acre.
80 yards by 60½ yards .. .. contains 1 acre.
70 yards by 68 1/9 yards .. .. contains 1 acre.
220 feet by 198 feet .. .. contains 1 acre.
440 feet by 99 feet .. .. contains 1 acre.
369 feet by 110 feet .. .. contains 1 acre.
726 feet by 60 feet .. .. contains 1 acre.
363 feet by 120 feet .. .. contains 1 acre.
240 feet by 180½ feet .. .. contains 1 acre.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock, which qualified for entry into the Advanced Register of the Herd Books of the A.I.S. and Jersey Societies. Production records for which have been compiled during the month of February, 1946 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	AUSTRALIAN ILLAWARRA SHORTHORN.			
	* SENIOR, 4 YEARS (STANDARD, 330 LB.).			
Sunnyview Velvet 3rd	J. Phillips, Wondai	11,880·4	492·923	Sunnyvale Monarch
	SENIOR, 3 YEARS (STANDARD, 290 LB.).			
Yarranvale Model 2nd	W. Henschell, Yarranlea	7,984·58	327·999	Trevor Hill Bosca
	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Valera Lila 11th	Sullivan Bros., Pittsworth	8,475·2	371·565	Alfa Vale Pride 2nd
Royston Myrtle	A. Lohse, Degilbo	6,715·0	257·736	Sunnyview Royal Chief
	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Valera Nancy 2nd	D. Sullivan, Pittsworth	8,705·47	368·367	Alfa Vale Pride 2nd
Bingleigh Vision 3rd	J. C. Meier, Mount Mort	8,620·67	351·154	Blackland's Jeans Victory
Bingleigh Queenie 8th	J. C. Meier, Mount Mort	6,408·49	287·001	Blackland's Jeans Victory
	JERSEY.			
	MATURE COW (STANDARD, 350 LB.).			
Lermont Belarine	J. Schull, Oakey	9,071·65	475·246	Belgonia Lady's Duke 2nd
Kathleigh Brown Mist	F. W. Kath, Moffatt	8,292·68	446·556	Calton Larris
Westbrook Pearl	Farm Home for Boys, Westbrook	8,098·15	427·384	Oxford Asters Lad
Tralee Margaret	W. Muller, Marburg	6,870·52	390·304	Oxford Rivalli
	SENIOR, 4 YEARS (STANDARD, 330 LB.).			
Kathleigh Whatnot	F. W. Kath, Moffatt	8,096·31	445·711	Calton Larris
Boree Coral	W. and C. E. Tudor, Branch Creek	6,941·75	349·136	Maurfield Larkspurs Gift

	SENIOR, 3 YEARS (STANDARD, 290 LB.).			
Strathdean Coronation	S. H. Caldwell, Bell	7,429·86	434·709	Navua Ladoras Ruler
Strathdean Tiny	S. H. Caldwell, Bell	7,235·22	433·132	Strathdean Ambers Ruler
Lermont Heather Bell	J. Schull, Oakey	7,960·85	423·148	Lermont Ambassador
Strathdean Joyful Jean	S. H. Caldwell, Bell	7.020·21	398·232	Navua Ladoras Ruler
Boree Promise	W. and C. E. Tudor, Branch Creek	7,076·7	392·054	Maurfield Larkspurs Gift
Boree Princess Rose	W. and C. E. Tudor, Branch Creek	7,535·53	363·059	Maurfield Larkspurs Gift
	JUNIOR, 3 YEARS (STANDARD, 270 LB.).			
Ashview Tot	C. Huey, Sabine	7,243·55	338·346	Trecarne Victor 4th
Glenview Royal Glory (258 days)	W. Muller, Marburg	5,709·5	325·082	Trinity Royal Prince
	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Romsey Ginger Girl	J. Wilton, Killarney	7,403·3	361·058	Oxford Pixies Victor
Boree Belle	W. and C. E. Tudor, Branch Creek	6,835·52	346·534	Maurfields Larkspurs Gift
	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Blackland's Cream Flake	W. S. Conochie, Sherwood	7.000·25	397·336	Englorie Cunning Victor
Kathleigh Whisper	F. W. Kath, Moffatt	5,603·81	336·559	Oxford Daffodils Victor
Glenrandle Luna	P. Kerlin, Killarney	5,481·9	305·320	Bellgarth Stylish
Kathleigh Primrose (258 days)	F. W. Kath, Moffatt	5,597·36	302·842	Oxford Daffodils Victor
Romsey Brown Betty	J. Wilton, Killarney	5.288·2	297·008	Oxford Pixies Victor
Brookland's Merry Primula	W. S. Conochie, Sherwood	6,230·95	294·031	Bulby Maria Keepsake
Glenrandle Verabelle	P. Kerlin, Killarney	5,626·8	293·149	Bellgarth Stylish
Ashview Marvel	C. Huey, Sabine	4,213·9	242·960	Trecarne Victor 4th



"Swelled Head" of Sheep.

(Continued from February Issue.)

G. R. MOULE, Veterinary Officer, Sheep and Wool Branch.

SOME of the causes of the symptom commonly referred to as "swelled head" in sheep were described in the January and February issues of the Journal and the remaining three causes of this condition are described here.

BARBER'S POLE WORM INFESTATION.

The barber's pole worm is very common in coastal and subcoastal areas, and wherever sheep are depastured in such districts infestation is likely to occur. These worms are also common in some of the inland districts, notably in the forest country to the east of Aramac and Barcaldine, around Morven, and in the sheep areas east of this centre.

Seasonal Occurrence.

The barber's pole worm is particularly plentiful during wet summer conditions. Investigations conducted conjointly by the C.S.I.R. and the State Department of Agriculture in co-operation with certain graziers in Queensland have shown that the activity of the worm increases during the spring months and heavy infestations are likely to occur from that time until the autumn.

The Effect of Heavy Infestation.

The barber's pole worm sucks blood from the sheep, and when a heavy infestation develops the blood may become so impoverished that the sheep no longer thrives. When sudden massive infestations occur, such a large volume of blood is removed by the worms that swellings occur in the pendent parts under the jaw. This condition is usually referred to as "bottle jaw."

Symptoms.

The symptoms exhibited by a sheep suffering from barber's pole worm infestation are typical of those seen in diseases where the blood is impoverished. The animals become weak; they do not travel well, and on mustering they are inclined to drop out from the flock and refuse to move.

The membranes of the mouth and eye are pale and blanched and the skin is dull and lifeless.

"Bottle jaw" (Plate 91) usually develops. Sometimes the swelling extends down the neck and brisket to the front legs.

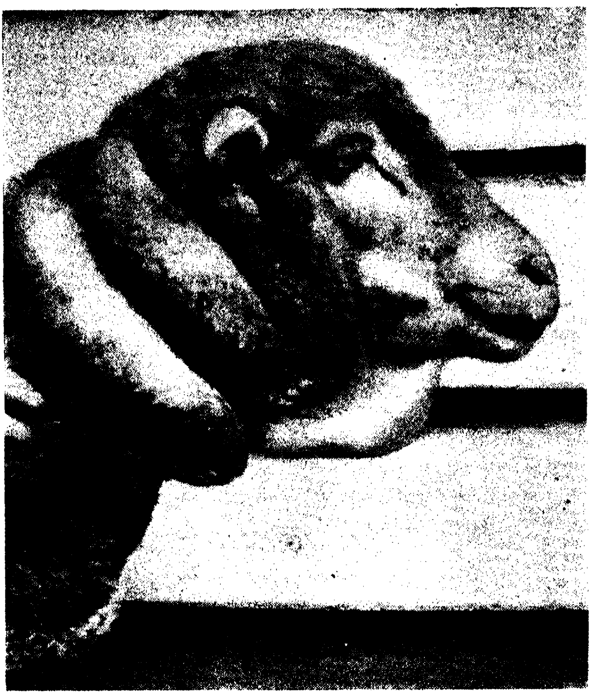


Plate 91.
"BOTTLE JAW."—A typical symptom of "swelled head" caused by barber's pole worm infestation.

Post Mortem Examination.

On post mortem examination the swellings under the jaw are found to be clean and jelly like and are restricted to the tissues under the skin. The blood is thin and watery, and a large number of barber's pole worms is found in the fourth stomach.

Preventive Measures.

As increased activity on the part of the barber's pole worm can be expected during the spring months, it is as well to drench in late August or early September to prevent a large "worm burden" developing.

Subsequent drenchings should be planned in accordance with the occurrence of summer rains and should be co-ordinated as much as possible with rotational grazing and with mating programmes.

Treatment.

As a routine preventive drench against barber's pole worms, bluestone and arsenic or carbontetrachloride may be used. If a heavy infestation occurs and many sheep develop bottle jaw, it is advisable to use phenothiazine at half the usual dose rate—i.e., give a 10-gram dose instead of a 20-gram dose.

YELLOW BIG HEAD.

Yellow big head is the common name given to a condition in which there is a marked increase in the sensitivity of the skin to light. The symptoms shown are suggestive of very acute sunburn, and they are brought about as the result of certain substances circulating in the blood. These substances gain entrance to the blood stream after the sheep has eaten certain plants.

Symptoms.

As the occurrence of yellow big head is dependent upon the reaction of the skin to light, the parts most commonly affected are the unwoolled portions of face and sometimes those of the legs.

Initially the skin becomes reddened, and later thickened, particularly over the lips and ears. There may be a yellowish discharge from the eyes, the mucous membranes become yellowish, and the eyelids droop. Later the head and lips become quite swollen and the skin is dark in colour and dried like parchment. During the greater part of the time when animals are affected they are disinclined to eat and to move around and they usually seek the shade.

Course.

The course of the disease varies. Some animals die, but the majority recover slowly.

Plants Responsible.

Several plants have been incriminated as being capable of causing this condition, and included amongst these there are burr trefoil, bullhead, onion weed, and paddy-melon. However, there is some evidence to suggest that any sudden flush of green feed may set up the condition in sheep which have been on dry pastures.

Treatment.

There is little that can be done from the point of view of medicinal treatment. It is advisable to allow affected animals to rest in the shade. Where valuable stud sheep show the symptoms the unwoolled portions of the face could be protected from the sun by covering them with black soot.

BIG HEAD DUE TO EATING CAUSTIC CREEPER.

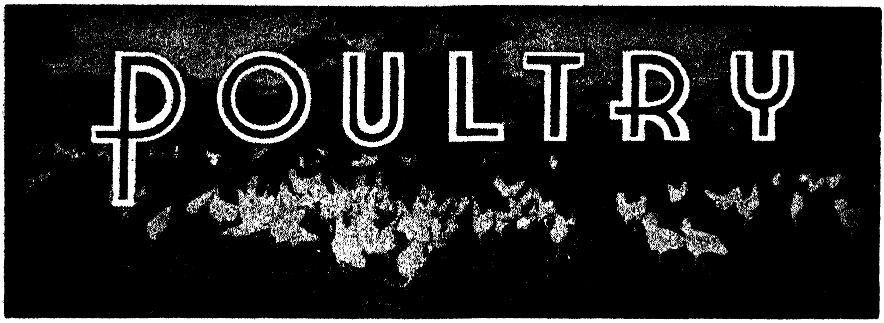
Caustic creeper or milk weed is a small herb-like plant which occurs extensively in Queensland. It is seen most commonly in the richer soils of the inland, and under certain circumstances hungry travelling sheep appear to be affected. There is considerable swelling of the head and neck, and if these are pierced a dark amber-coloured fluid exudes.

As the only real danger is with travelling sheep, care should be taken to see that heavy stands of this plant are avoided when the sheep are hungry.

TO SUBSCRIBERS.

Kindly renew your subscription without delay. Write your full name plainly, preferably in block letters.

Address your subscription to the Under Secretary, Department of Agriculture and Stock, Brisbane.



Eggs—Preserve Their Quality.

By P. RUMBALL, Officer in Charge, Poultry Branch.

EFFICIENCY in breeding, feeding, and general care of poultry with the object of obtaining the maximum production will not make poultry-raising a success unless similar care and attention are given to the product—eggs.

Although eggs from healthy stock and produced under the most suitable conditions are invariably uncontaminated within the shell, they are, under certain conditions, subject to bacterial and mould infection, and consequently may suffer deterioration from this source as well as deterioration due to heat and other causes. The fowl produces one of the most nutritious and wholesome forms of food for mankind, and it rests with the farmer, in the first place, to retain it in this form, and with every person handling eggs prior to their reaching the consumer to protect the egg from any form of deterioration.

The wholesale price of large eggs of first quality to-day is 2s. per dozen, whereas only 1s. 5d. is being paid for the same sized egg of second quality. On few farms does the percentage of first quality large eggs exceed 80 per cent. At certain periods of the year on some properties little more than 50 per cent. of first quality eggs are produced. Poultry raisers cannot afford to lose approximately 25 per cent. of the value of a large proportion of the product of their farms and remain in the industry. In addition to the financial loss incurred by the individual farmer who produces a large proportion of second quality eggs, there is the collective effect of the accumulation of large quantities of eggs upon the market, as they have a most depressing effect upon values and are most difficult to dispose of at prices commensurate with their cost of production.

The only outlets for Queensland eggs are the Australian and overseas markets. It is not economically sound to export any eggs other than those of first quality, and it is not reasonable to expect the Australian consumer to be satisfied with anything less than the overseas buyer.

STRUCTURE OF THE EGG.

A brief outline of the structure of the egg and the various causes of depreciation in quality, it is hoped, will make for better care in handling and for the acceptance of recommendations made with the object of maintaining quality.

The yolk is the first part of the egg to develop. This takes place in the ovary, where many hundreds of yolks are situated in various stages of development. Each yolk is enclosed in a sac which, when the yolk is mature, ruptures along the non-vascular area, releasing the yolk into the oviduct. Occasionally this rupture extends beyond the non-vascular area, causing bleeding from one of the small blood vessels of the yolk sac, with the result that the yolk is released with a clot of blood. The presence of blood with the yolk renders the egg unmarketable on account of its appearance. When a producer is faced with a high percentage of such eggs, he should examine the system of feeding. Over-stimulating foods are suggested as a probable cause; if an examination of the total ration supplied indicates that the protein content is in excess of 15 per cent., the ration should be altered to reduce the crude protein content to that level, such alteration having as its object the reduction of the incidence of eggs with blood spots.

The colour of the yolk is influenced by feeding, and may vary from that of a pale straw colour to a deep orange-red. The colour most sought after is that of a good golden yellow, and breeders who are producing pale yolks may improve colour by feeding yellow maize and green feed.

The yolk is enclosed in a membrane referred to as the vitelline membrane. On the surface of the yolk will be noticed a light circular area. This is the germinal disc. Around the yolk is a layer of thin albumen. This is enclosed in a denser layer of thick albumen which is twisted at each end, the twisted portion being known as the chalaza. Around this thick albumen there is an outer layer of thin albumen. Next comes the inner shell membrane, then the outer shell membrane; the shell is then laid on, not in its solid form as seen, but by the accumulation of lime salts in more or less a semi-liquid form which becomes hardened before the egg is laid. Naturally there are minute pores between the particles in the shell forming material. Nature then, as a further protection, coats the egg with a gelatinous material before it is laid. This last coating is frequently referred to as the "bloom" of the egg, and if the egg could be carefully collected from the hen when laid, and allowed to dry, one would have then the best possible product to handle, and if given the correct subsequent treatment there would be little cause for complaint as to quality. This, however, is not possible under commercial conditions, but it would be as well at the outset to realise that the less the removal of the protective coating the better is the keeping quality of the egg, and therefore the producer should do all in his power to maintain the egg in its nearest approach to that as laid and realise that until some protective medium is found which may be added to any fluid used for washing eggs, without detriment to the egg, such washing renders the egg more susceptible to deterioration.

FACTORS IN DETERIORATION.

The poultry raiser has three principal factors to give consideration to in the protection of the egg quality—

(*a*) Fertile eggs;

(*b*) Soiled eggs;

(*c*) The effect of heat upon the egg.

Fertile Eggs.

There are other influences to which eggs may be exposed which affect quality—namely, the attack of moulds and bacteria. These influences, however, are not common where the best possible conditions for production have been followed.

The production of fertile eggs should be avoided as far as possible. Although incubators are operated at a temperature of 100 deg. Fahr., it does not need a similar temperature to commence the development of the germ, and in the height of summer it is almost impossible on many of our farms to keep eggs at a sufficiently low temperature to prevent some form of cell division taking place with the fertile egg, and once embryonic development has advanced to any degree and stops, decomposition soon follows.

Under these circumstances, males should not be allowed to run with the flock, except during the period when breeding practices are in operation.

Soiled Eggs.

Nests.

The next condition to guard against is the soiling of eggs within the nests. Naturally an ample supply of clean nests, sufficiently roomy for the bird, should be provided. In these nests it is essential to have some form of material to make the nest comfortable and attractive to the bird, to protect the egg from being broken, and to protect the egg, as far as possible, from becoming soiled. Many egg producers use old-type butter boxes for nests. These are very suitable in size, and in planning any form of nests the butter box could be used as a guide for size. The big factor is to construct nests so that they are readily cleaned, and of material that is free from odours, as eggs readily absorb taints.

Various forms of nesting materials are used, such as straw, shavings, sawdust, sand, and shell-grit. Shavings and sawdust are very absorbent and not scratched out of the nest to the same extent as straw, and by reason of their fineness have a greater cleansing effect upon the feet of the birds, thereby preventing to some extent the soiling of eggs. If sawdust or shavings are used, pinewood residues should be chosen, as many of our hardwood sawdusts have a staining effect upon the shell of the egg. Shell grit is a reasonably good nesting material, but is naturally not so absorbent as sawdust and is too expensive in many districts for extensive use. Sand closely resembles shell grit, but many particles become attached to the moist gelatinous coating of the egg when it is laid and are most difficult to remove without washing.

Egg Collections.

It is not sufficient to provide suitable nests and nesting material. The frequency with which eggs are gathered has a very marked effect upon their cleanliness and more than that upon the labour entailed in preparing the eggs for market. Three gatherings per day is a practice that should be followed upon most farms, particularly during the period of the year when production is at its height and several birds are visiting each nest daily. When production is slack, generally in the cooler months, the gathering of eggs can be reduced to twice daily. Not only does the frequency with which eggs are gathered assist in keeping the eggs clean, but it protects also against breakages and the possible development of the vice of egg-eating.

Effect of Heat.

The egg, when manufactured, is full. Upon cooling, there is a separation between the two membranes within the shell of the egg, which creates a small air cell. Heat hastens the evaporation of the moisture contained in the egg, enlarging the air cell. The albumen becomes thinner. The yolk becomes more visible upon candling, and instead of being retained in a more or less central position of the egg becomes "sided" and at times attached to the shell. When this type of egg is broken for poaching or frying purposes the yolk is flatter, not standing up like a new laid egg or an egg which has not been subjected to heat, and the albumen spreads by virtue of its thinness. The consumer does not appreciate either of these conditions.

It does not require a very high temperature to cause this breaking down, and it has been found that a temperature over 60 deg. Fahr. is conducive to rapid deterioration of quality. In fact, temperatures of 68 deg. Fahr. have been known to stimulate embryonic development, therefore the coolest position upon the farm should be sought for the storage of eggs pending shipment to markets. Further protection of the egg against excessive heat is given by frequent gatherings, as it prevents their being reheated by visits of several other birds to the nests.

Eggs should be gathered in 2-gallon buckets with rigid sides. A bucket of this capacity will hold from 100 to 120 eggs, the bulk of which is conducive to the rapid loss of animal heat when placed in cool quarters. The nests should be erected in positions that are not exposed to the sun. For this reason nests extending in front of the poultry sheds are not recommended as most suitable for the preservation of quality. During transit to market cases of eggs should also receive some protection.

The storage of eggs on the farm pending shipment to market is most important. They should be held in a room which is as uniform in temperature as possible. One between 40 deg. and 60 deg. Fahr. would be ideal. It should be free from odours and have good ventilation If the air is too dry the humidity may be increased by setting pans of water about the room or sprinkling the floor. Excessive moisture, however, should be guarded against. This is indicatd by condensation.

Moulds and Bacterial Infection.

Mould invasion of eggs is not uncommon in Queensland, particularly in the early part of the year when humid conditions prevail. Mould growths in several instances have been traced to the ordinary brown strawboard fillers frequently used, and on other occasions to nests in which mouldy grass or straw has been used for litter.

Humid conditions are conducive to the development of moulds, which enter the eggs through the pores of the shells, causing them to develop what are known as black rots. Protection is afforded by using in the nests only sweet and dry nesting material, by keeping the cases and fillers used for packing as dry as possible, and by never packing eggs that have moisture adhering to the shell.

Bacterial invasion of the egg is not uncommon, and in every instance that has been investigated the infection has extended only to those eggs that have been submitted to a cleansing process by washing. As previously mentioned, washing removes the protective coating placed on the shell by nature, and as it is a common practice to totally immerse soiled eggs in water which has been polluted by hundreds of others, it will readily be understood how easy it is to convey harmful bacteria from one egg to another.

As a protection against bacterial invasion of the egg, as much as possible of the dirt and filth adhering should be scraped off with a knife while the egg is dry, the water used for washing purposes replenished at frequent intervals, and any cloths used in cleaning kept clean by frequent rinsings and, if the cloth is to be used from time to time, sterilized by boiling. In any cleansing process it may be necessary to remove stains with an abrasive. When such is necessary, some odourless material which is not of too coarse a nature should be selected.

Recently an experiment was conducted by the Missouri Agricultural Experiment Station by adding to the egg-washing water 1 per cent. of lye water as a protective against bacterial invasion. This experiment indicates that the problem of egg quality due to bacterial invasion is met elsewhere than in Queensland. The Missouri experiment appeared highly satisfactory, but in view of the caustic nature of the solution used it does not appear to be a practice that could be generally adopted, and it is only mentioned to indicate the need for the exercise of the greatest care in production and the desirability of reducing the need for washing until some suitable protective agent is found.

Packing.

The practice of using chaff, &c., for packing material fortunately has largely ceased, and the standard case and fillers adopted. Many producers, however, with the object of effecting greater protection to the egg, use chaff and material of a like nature in the bottom and frequently on the top of cases. This is not recommended. As well as causing the eggs to become dusty in appearance the practice exposes the egg to infection by moulds. If it is necessary to use some material to take up the slack in the case, crumpled paper is preferable.

The standard 30-dozen case, as now used by the Queensland Egg Board, is one that obviates the necessity for any further protection, and is definitely recommended to all producers as the best means of packing.

Summary.

Adherence to the following rules will ensure the production of quality eggs:—

(1) Breed only from birds that produce eggs of satisfactory size and shape and good-quality shell.

(2) Provide only wholesome food, including shell grit and fresh water. Remember that yolk colour is improved by the feeding of green feed and yellow maize.

(3) Produce infertile eggs for market, thereby preventing them from decay due to partial embryonic development.

(4) Provide at least one nest and clean nesting material for each five layers. Keep the nests dry and protected from the sun.

(5) Do not allow broody hens to occupy nests. They heat up the eggs.

(6) Gather eggs in a clean bucket thrice daily in summer and twice in winter, and stand in a cool place until animal heat is lost before packing.

(7) Do not wash eggs unless it is absolutely necessary to do so to make them thoroughly clean. Aim at keeping them clean by good management.

(8) Keep eggs until marketed in a cool, clean room free from odours.

(9) Market eggs at least twice weekly, protecting them from the sun during transit.

(10) Use only standard cases and fillers for packing.

THE FUTURE FARMERS OF AUSTRALIA.

As in other States of the Commonwealth, the junior farmers' movement is a live issue in Queensland, although, up to the present, attention has been concentrated on the development of home project clubs in schools, especially in country districts. It is suggested that there is need for extending the movement to include boys and girls who have left school along the lines of the junior farmers' clubs in the southern States and which have taken firm root in many rural communities. As an outstanding agricultural educational movement, the junior farmers' clubs in the South are doing an excellent national work. They are already showing how to produce crops and breed and feed farm animals at less cost, how to conserve soil and its fertility and to lay foundations of future agricultural prosperity. This junior farmers' club movement aims at building better farms, better homes and better citizenship.

To some extent, the Australian Junior Farmers' Club Movement compares with the Future Farmers of America National Organization of, by and for farm boys studying vocational agriculture in public secondary schools. The major purposes of that organization are to develop agricultural leadership, co-operation, citizenship, improved agriculture and patriotism. It is now recognized as the largest farm boy organization in the world. On their home farms the boys and girls put into practice the principles of farming in all its branches. They have established the beginnings of quality beef and dairy herds, and apply improved practices in crop production. Above all, they are proud of the fact that they are farmers and that farming is their chosen life vocation. This, briefly, is their creed:—

A belief in the future of farming, with a faith born not of words but of deeds—achievements won by the present and past generations of farmers; in the promise of better days through better ways.

A belief that to live and work on a good farm is pleasant as well as challenging, a belief based on an inborn fondness for country life and its associations. A belief in leadership from themselves and respect from others.

A belief in their own ability to work efficiently and think clearly, with such knowledge and skill as they can attain, and in the ability of organized farmers to serve their own and the public interest in marketing of their own products.

A belief in less dependence on begging and more power in bargaining; in the life abundant and enough honest wealth to help make it so—for others as well as themselves; a belief in less need for charity and more of it when needed; in being happy themselves and playing square with those whose happiness depends on them.

A belief that country life and industry can and will hold true to the best traditions of national life.

That is the creed of the future farmers of America, and, although expressed a little less colourfully perhaps, it is the creed of the future farmers of Australia—members of the Junior Farmers' Club Movement in Victoria and New South Wales, which, no doubt, will spread to other States.

The main object of the Junior Farmers' Club Movement is to keep farmers' sons and daughters on the land and, through vocational agriculture, enable them to develop the ability to become successfully established in farming for themselves. "Learning to do; doing to learn; earning to live; living to serve"—that is their motto.

GENERAL NOTES

Staff Changes and Appointments.

Mr. D. N. Sutherland, B.V.Sc., has been appointed Veterinary Officer, Division of Animal Industry.

Mr. A. F. S. Ohman, Divisional Veterinary Officer in the Department of Agriculture and Stock, has tendered his resignation.

Mr. J. L. Schofield, Agrostologist, has resigned from the Department.

Mr. C. G. Williams, Adviser in Horticulture, has been appointed Supervisor (Preparation and Transport), Horticulture Branch, Department of Agriculture and Stock.

Mr. K. King, Adviser in Horticulture, has been appointed Senior Adviser, Horticulture Branch, with headquarters at Rockhampton.

Butter Concentrate.

Orders in Council have been issued authorising the Queensland Butter Board to engage in the production of dehydrated butter and/or butter concentrate in lieu of tropical butterfat spread. During the war years, the Board produced quantities of tropical butterfat-spread for the use of *Field Forces* in tropical areas. The product was developed and improved from time to time until, finally, a dehydrated butter which will keep without refrigeration for considerable periods was produced. This product is known as butter concentrate.

Queensland Dairymen's Organization.

In November, 1945, the provisions of *Section 30* of *The Primary Producers' Organisation and Marketing Acts* were extended to the dairying industry by *Order in Council,* in which provision was made therein for a field organization for the dairying industry consisting of local dairymen's committees, district dairymen's councils, and the Queensland Dairymen's State Council.

Regulations, known as *The Dairymen's State and District Councils Regulations of* 1946, have been issued to define the procedure to be followed in the conduct of the initial elections of the nine district dairymen's councils, and the convening of the first meetings of such councils and of the Queensland Dairymen's State Council.

The dairymen in each of the nine districts specified in the *Order in Council* of November, 1945, will elect seven members to each district dairymen's council. After the elections, each district dairymen's council, at its first meeting, will choose one of its number as a member of the Queensland Dairymen's State Council. The organisation will then proceed to function in accordance with the provisions of the *Order in Council* of November, 1945.

Veterinary Science Scholarships.

Following the institution of veterinary science scholarships last year to provide for veterinary staff requirements of the Division of Animal Industry, Department of Agriculture and Stock, it has been announced that three scholarships have been allotted for 1946 to Messrs. R. J. Olds (Fairfield), G. I. Alexander (Charters Towers), and D. F. Mahoney (Yengarie). The scholarships cover a period of five years, the first year of the course to be taken at the University of Queensland, and the remainder at the Sydney University.

In addition to these scholarships, certain officers of the Department have been granted the necessary leave of absence to enable them to take a full-time course in veterinary science under the Post-War Reconstruction Training Scheme.

Northern Pig Board.

An Order in Council has been issued under *The Primary Producers' Organisation and Marketing Acts* extending the operations of such Acts to pig carcasses grown within the area of the Northern Pig Board, and placing such pig carcasses under the control of the Board. Previously, the *Acts* applied only to live pigs reared within the area.

Rural Topics

Food by Air.

Will transport aircraft be used to any great extent in future food deliveries is a question which has come up since it was seen how effective air transport of perishable foods was during the war. A regular food supply service was maintained between Australia and advanced Army areas in New Guinea and elsewhere. On some runs, fresh beef was transported by air daily; and other fresh foods also were sent regularly to forces in the field. "Biscuit bombers" were always a welcome sight to Diggers on patrol. Then, again, there was the fresh fish delivery service between points on the Gulf of Carpentaria and some inland centres.

The question of how far air transport will affect the marketing of foodstuffs generally also is of interest to primary producers. Yet the practical side of air-borne food delivery depends on how much such a service adds to the delivered cost, and whether consignees would be willing to pay the difference. Anticipated (or estimated) ton-mile rates by air are considerably higher than by rail or road, but the shorter air distances from point to point might reduce the difference in freight cost. Other factors have to be considered, of course. Take fruit, for instance. What effect would changes in air pressure which occur during flight have on the fruit? All factors require study, but practical economies from lighter packages of air-borne fruits and vegetables are considered probable; also savings in cold storage en route. The range and speed of modern aircraft now make it possible to deliver today's tree-ripened fruits on tomorrow's markets anywhere in the country.

However, it all adds up to a total of cost and its comparison with other transport systems. Yet, regular food delivery by air on an economical basis seems well within the realm of practicability, and it certainly has an interest for the primary producer, even though at present it may be only a speculative interest. "Biscuit bombers" routed regularly on radio beams will, one day, assuredly be accepted as a normal transport service.

Working for a Better World.

Whatever may be the outcome eventually of present world movements for a better agriculture, it is good to feel that some progress is being made in the world-wide quest for peace and security. At the recent conference of the Food and Agriculture Organisation in Canada, at which Australian producers were represented, an entirely new doctrine in human relations was evolved. This new concept envisions a day when there will be plenty rather than scarcity, when there will be co-operation instead of cut-throat competition which depresses standards of living and leads eventually to war. The new school champions an expanding economy and advocates co-operation between sellers and buyers in order to adjust production to consumer needs and thus avoid fanatical price-cutting and ruinous competition.

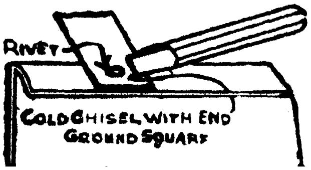
For generations we have been learning all the tricks in an economy of scarcity. It may require another generation or two to learn how to manage and enjoy an economy of plenty.

The International Food and Agriculture Organization supports this new doctrine and aims to attain a co-ordinated balance in food output among the primary producing countries of the world.

GADGETS AND WRINKLES

SHEAR CUTS FOR RIVETS.

The best way for cutting off rivets is to shear them off with a square end chisel rather than cut them with a sharp edge. This is the method used by most wreckers in tearing up car frames.



AN IMPROVISED CONCRETE MIXER.

Where farmers have some seasonal concreting to do the improvised mixer illustrated will be of great assistance in reducing the amount of manual work. The construction of the mixer can be fairly readily seen from the photograph, most of the materials used being quite plainly shown; the main essentials are an oil drum, some timber, and a piece of 1-in. piping about 10 ft. long.

The piping passes through a neat hole at each end, and just outside the drum at each end a pin should be inserted in the pipe to prevent the drum from sliding. Immediately below the drum the piping should be supported by bearings between the upright timbers, while the end of the piping should be held down to prevent the drum from tipping during mixing, and yet to permit of easy rotation in working.

The drum requires to have nearly half the top cut away for filling and emptying, and a handle fitted near the outer edge to allow the drum to be rotated by hand during mixing.

As material is mixed the drum can be emptied by releasing the foot of the piping, and using the piping as a lever to direct and regulate the flow of the mix.

The mixer illustrated was seen in use on Mr. W. Sanderson's farm at Kaitoke, Great Barrier Island.—C. Walker, Instructor in Agriculture, Thames, in the *New Zealand Journal of Agriculture.*

The FARM HOME

Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

HOW MOTHERS AND CHILDREN CAN OBTAIN THEIR VITAMINS.

THE Sister at one of the welfare centres was advising a grandmother who was taking care of her deceased daughter's baby. The baby was four weeks old and the sister said that he must now have some strained orange or other fresh fruit juice added to his diet in order to provide him with vitamin C, which is lacking in the food of bottle-fed infants. The grandmother looked rather scornful, "I don't care much for these new fangled ideas," she said, "no one bothered about vitamins when my children were little and there's nothing much wrong with them." The sister remembered that the baby had an uncle who had returned from a Japanese prison camp suffering from a disease known as beri-beri, and so she enquired how he was. The grandmother brightened up as she related the marvellous improvement in his condition week by week. "Do you know what is curing him?" said the sister, "vitamins." After further explanation the grandmother was more than willing to start the baby on his fruit juice at once.

Vitamins are not a new fangled idea. They are chemical substances which occur and always have occurred in all natural *whole* foods and each has its own work to perform in keeping the body healthy. Because our soldiers who were prisoners of war did not have enough food and the food they had was mostly white or polished rice, many of them developed what are known as deficiency diseases caused by the absence of these important vitamins from their food. Their condition would have been much worse in many cases if doctors and others who were imprisoned with them had not known about vitamins and tried to obtain them from shrubs and other herbage which they found in the bush.

Everyone needs a good supply of each vitamin in order to remain physically fit and able to resist infections, but expectant and nursing mothers and growing children need an extra supply and great care should be taken to see that they get them. For convenience, the vitamins are known by the letters of the alphabet, and it is important that people in charge of mothers and children and also the mothers themselves should know the vitamin-containing foods.

There are several vitamins, but only four are likely to be deficient in Australian diets. They are:—

Vitamin A.—This is found in cod liver oil and other fish oils, also in butter, egg yolk, milk, cream, liver and green and yellow vegetables and fruits. This vitamin is necessary for children's growth, and also helps them to resist illness as well as preventing certain forms of eye trouble.

Vitamin B1.—This is found in *whole grain* cereals, marmite and vegemite, eggs, and seeds such as peas, beans and nuts. This vitamin is necessary for normal appetite, good digestion, prevention of constipation, and the disease of the nervous system, known as beri-beri. That is why it is so necessary for people to eat oatmeal or wheatmeal porridge and whole-wheat bread.

Vitamin C.—This is found in good quantity in oranges and other citrus fruits, tomatoes, papaws and pineapples. A small amount is in uncooked vegetables. If fruit is not available or is too expensive for the family budget, vitamin C for the baby may be obtained by extracting the juice from raw carrots, potatoes or swede turnips. Foods containing vitamin C tend to prevent dental decay, infections, anaemia and the disease known as scurvy.

Vitamin D.—This is present chiefly in cod and other fish liver oils, in the liver of animals, and in tinned salmon and herrings. Some is present in butter and egg yolk. Unlike all other vitamins it can be formed in the body by exposing the skin to direct sunlight. That is why mothers and babies must have sun baths. Vitamin D helps to build sturdy, vigorous children with strong bones, straight active limbs and good teeth.

Any further advice about this or any other matter can be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau*, 184 *St. Paul's Terrace, Brisbane,* or by addressing letters, *Baby Clinic, Brisbane*. These letters need not be stamped.

IN THE FARM KITCHEN.

For the Colder Weather.

Baked Meat Pudding.

This is an excellent way to use up any left-overs:—Requirements: 1 lb. cold meat (minced); 1 thick slice bread soaked in milk or stock; 2 small onions; 1 level tablespoon curry powder; juice of one lemon; 2 tablespoons sultanas; 1 beaten egg; 1 cup milk; a little good dripping; pepper and salt to taste.

Fry the onion in dripping and brown. Add all the ingredients except the egg and milk. Place in a fireproof dish, pour over egg and milk mixed together, then dot with a little good dripping and bake in a moderate oven for 25 minutes.

Pumpkin Pie.

Requirements.—1 tin condensed milk or a little less, according to taste; ¼ cup lemon juice; 2 cups mashed dry pumpkin; 1 teaspoon nutmeg; ½ teaspoon ground ginger; 1 teaspoon ground cinnamon; a pinch of salt; 1 cup sultanas or currants; short crust.

Add lemon juice to the condensed milk and beat until it thickens. Add the remaining ingredients and fill a tart plate lined with a good short crust. It may be cooked as an open tart or covered with strips of pastry formed lattice fashion. Bake in a hot oven for 10 minutes, then lower the heat and cook for about 20 minutes longer.

Different Ways of Serving Cauliflowers.

(1) After steaming or boiling the cauliflower in the usual way, shake over it fried breadcrumbs. To prepare these melt some butter about half an ounce, in a frying pan. When it has ceased to bubble sprinkle in some fine soft crumbs. Fry till lightly browned, shaking them about frequently while cooking. Season them with salt and pepper.

(2) Cover the cooked cauliflower with a rich white sauce. Over this shake grated nutmeg.

(3) Instead of the usual white sauce, cover the cauliflower with a tomato sauce made as follows:—Cut up roughly one pound of tomatoes. Put into a saucepan with a tablespoon of water and salt and pepper to taste. Cover the pan and bring slowly to the boil. Simmer gently, mashing down the tomatoes once or twice to extract as much juice as possible. Simmer for about ten minutes. Strain and press the pulp through a sieve. Measure and when cool make up to a cupful with cream or creamy milk. Melt one ounce of butter in a saucepan. Remove from the fire and add three-quarters of an ounce of flour. Blend smoothly with a wooden spoon. Gradually stir in the tomato and cream mixture. Return to the fire and stir till the sauce boils. Boil and stir for three minutes. Add a bare teaspoon of Worcester sauce. Mix and pour over the hot cauliflower.

QUEENSLAND WEATHER IN FEBRUARY.

Over average aggregate district rainfalls were recorded in the Peninsula, Carpentaria, North Coast, and adjacent Central Coast West districts, and were the result of the heavy to local flood totals registered mainly during two periods, 9th/12th and 14th/16th. Monthly totals included—Peninsula, Cape York, 1,855 points; Moreton, 1,383; Laura, 1,328; Walsh, 1,320; Lower Carpentaria, Burketown, 1,850; Cloncurry, 981; Normanton, 1,029; Kamileroi, 993; Upper Carpentaria, Lyndhurst, 1,762; Einasleigh, 1,103; Mt. Surprise, 1,035. In the North Coast Barron, falls ranged from 773 points at Chillagoe to 2,204 at Mossman; North Coast Herbert, 858 Clarke River to 5,510 Tully; Central Coast, Giru 1,477 points. A number of over 10-in. totals in the Central Coast East included 1,608 points Mingela, 1,868 Reid River, and 1,852 Woodstock, and the Central Coast West averaged 6 to 7 in. In the East Darling Downs and Moreton districts over average areas received storms early and late in the month, and several over 10-in. monthly totals in the latter Division included 3,849 points Springbrook, 1,219 Tallebudgera, and 1,256 Mapleton. In many Port Curtis sections, however, the run of dry or well under average rainfall months continued with February 64 per cent. below average. The main pastoral areas of the Central, Central-West, and Southern Interior of the State missed the rains which passed westward through the Carpentaria to the Northern Territory and ultimately south through Central Australia to the south-eastern States. District averages of from 21 points in the South-West to 147 in the Central Lowlands were less than half normal, and continuance of seasonal tropical influences during March with a widespread soaking rain would do much to restore the dry South-West areas and consolidate winter pasturing conditions generally.

Floods.—Condamine River and *Southern Border streams* were still carrying run-off from late January rains, and local flooding was caused in the lower reaches early in the month from 2nd to 11th. At Surat, the Balonne River reached a height of 25 ft. 5 in. on the 6th. At Dirranbandi the Balonne Minor reached a height of 11 ft. 9 in.—3 ft. 9 in. above local level. At Condamine 22 ft. 6 in.—6 ft. above local flooding. *Burdekin.*—Two periods of minor flooding occurred on the northern Burdekin catchment, which later extended to lower Burdekin—viz., 10th to 16th and 22nd to 24th. Maximum heights reported were at bridge 9 ft. 8 in. over rails on 12th and 3 ft. 10 in. over rails on 22nd. Sellheim 28 ft. 6 in. on 11th, 28 ft. 9 in. on 20th. From 10th to 16th and 22nd to 24th flooding also occurred on upper headwaters of Gilbert and other Carpentaria streams. Einasleigh reported the Einasleigh River 6 ft. over rails on three occasions—12th, 16th, and 21st. There was also considerable local flooding in Central Coast low-lying areas and shorter river basins.

Temperatures.—Maximum temperatures varied from minus 4.1 deg. at Boulia, 2.3 deg. Cloncurry, 1.4 deg. Georgetown, to 3.8 deg. above normal at Mitchell. Several were about normal. Minimum averages were mostly above normal, and ranged from 1.6 deg. below at Palmerville to 4.5 deg. above at Mitchell. Thargomindah reported 110 deg. (2nd), and Windorah over 100 deg. on 17 days, Quilpie 20 (12 consecutive, 6th to 17th).

Brisbane.—Temperatures, mean maximum 84.8 deg., normal 84.4 deg.; mean minimum 71.0 deg., normal 68.6 deg.; mean temperature 77.9 deg., normal 76.6 deg.; highest daily 93.8 deg. on 20th; lowest daily 66.8 deg. on 24th. Rainfall, 732 points on 17 days, average 623 on 13 days. Sunshine, 189.8 hours, normal 205.7 hours. Maximum wind gust 41 miles per hour from south on 28th.

The rain position is summarised below—

Division.	Normal Mean.	Mean February, 1946.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	1,308	1,358	4 above
Peninsula South	896	1,109	24 ,,
Lower Carpentaria	617	833	35 ,,
Upper Carpentaria	556	674	21 ,,
North East, Barron	1,288	1,564	21 ,,
North Coast, Herbert	1,477	1,970	33 ,,
Central Coast, East	792	651	18 below
Central Coast, West	475	735	55 above
Central Highlands	351	178	49 below
Central Lowlands	310	147	53 ,,
Upper Western	304	307	1 above
Lower Western	195	91	53 below
South Coast, Port Curtis	576	209	64 ,,
South Coast, Moreton	658	620	6 ,,
Darling Downs, East	304	213	30 ,,
Darling Downs, West	233	165	29 ,,
Maranoa	282	91	68 ,,
Warrego	209	117	44 ,,
Far South-West	165	21	87 ,,

QUEENSLAND WEATHER IN MARCH.

The only districts showing over average aggregate rain totals were the North Coast Herbert, Central Coast East and West, and the South Coast Moreton. Heavy flood rains in these areas were the result of two cyclones, one during the first week affecting the tropical coast and adjacent highlands and the second in the third week the Moreton areas. Both distributions missed the Port Curtis section where patchy rains of 37 per cent. below normal maintained the unusually protracted dry spell for that part of the State. The Darling Downs East and Central Highlands received under average aggregate totals of 223 and 160 points respectively, but the greater part of inland Queensland was unusually dry for March, and many districts, especially in the western half, *reported no rain*. Previous seasonal rains during January benefited the whole of the State, and most of the tropical interior fared well in February. In the Central-West and most of the subtropical interior, however, *the absence of rain in March* was preceded by a dry February and the 3 to 4 inch falls of January in the south-west quarter and southern interior border districts will need to be supplemented by an early general soaking fall to ensure reasonable winter and spring pastoral conditions. Apart from the dry sections in the Port Curtis and adjacent inland areas, agricultural and pastoral conditions are generally good in the south-east quarter.

Flooding.—Under cyclonic influences extensive *heavy to record flooding* occurred during the first part of the month in all tropical coast streams between Cooktown and Rockhampton back to the adjacent highlands and east Carpentaria. Widespread damage, soil erosion, protracted traffic disabilities, were reported. There was some loss of life and the town of Home Hill was out of communication for a couple of days. The Burdekin River flooded from all catchment areas with *record heights*. Inkerman Bridge water 24 *feet* over bridge 9 a.m., 4th (previous height 14 feet—14th March, 1945). Sellheim gauge 70 feet 6 inches (5.30 a.m., 4th), previous height 63 feet 7 inches (12th March, 1927). Lornsleigh (Suttor River) 35 feet (7th), previous height 40 feet (23rd February, 1944). *Einasleigh Bridge* 9 feet over rails (4th). Townsville and Mackay also suffered considerable damage. Some heavy rain totals for the period 1st to 6th included on the inland edge of the storm area—578 points Irvinebank, 712 Clarke River, 740 Balfes Creek, 764 Mount Coolon, 526 Twin Hills, 453 Clermont. Near the coast 12 to over 20-inch amounts were general—2,073 points Babinda, 2,139 Tully, 2,684 Giru, 2,619 Calen, 2,440 Finch Hatton. A private observer reported 26 inches in 21 hours of rain on the Upper Ross River, 30 miles from Townsville. *Twelve inches between 3 a.m. and 5 a.m.*, 3rd March. The Moreton district flooding, also from cyclonic influences, was more of the local type form. as rains eased in time to prevent heavy general stream rises which occurred in the Northern Rivers of New South Wales. Heavy two-day falls, 24th-25th, included many 10 to 15-inch amounts—Bald Knob 1,885 points, Maleny 1,592, Mount Tamborine 1,797, Springbrook 2,509, of which 25 *inches* fell in 26 hours, 9 a.m., 24th, to 11 a.m., 25th (four-day total—3,677 points).

Temperatures.—Maximum temperatures in the south-west quarter ranged from normal at Mitchell to 3.4 degrees below at Thargomindah and Boulia. Other districts showed Longreach 1.2 degrees above to 3.2 degrees at Palmerville. Minimum readings varied from slightly below to 3.8 degrees Mitchell and 4.5 degrees Thargomindah. Days over 100 degrees—Longreach 5, Boulia 4, with 103 degrees highest reading at both places.

Frosts.—Some very early light local frosts—Bybera (2), 13th (39 degrees/26 degrees), 18th (40/29 degrees), Stanthorpe 3, minimum readings 37 degrees/31 degrees (13th), and 28 degrees and 30 degrees on grass (27th and 28th).

Brisbane.—Pressure 9 + 3 29.811 inches (normal 29.966 inches), lowest since 29.802 inches in 1892. Minimum barometer reading at 1510 hours (25th) 29.211 inches (second lowest on record—29.207 inches on 12th March, 1891). Temperatures—mean maximum 82.4 degrees (normal 82.2 degrees), mean minimum 65.9 degrees (normal 66.4 degrees), mean temperature 74.1 degrees (normal 74.3 degrees). Highest daily 93.8 degrees (10th), lowest daily 55.6 degrees (28th). Rainfall—834 points (16 days)—average 562 points (15 days). 406 points on 25th, highest since 499 points on 15th March, 1939. Highest wind gust—46 m.p.h. from south-west at 1355 hours 25th.

The rainfall position is summarised below:—

Division.	Normal Mean.	Mean March, 1946.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	1,219	491	60 below
Peninsula South	687	253	63 ,,
Lower Carpentaria	398	3	99 ,,
Upper Carpentaria	344	146	58 ,,
North Coaast, Barron	1,379	669	51 ,,
North Coast, Herbert	1,390	1,679	21 above
Central Coast, East	603	1,127	87 ,,
Central Coast, West	345	868	152
Central Highlands	279	160	43 below
Central Lowlands	239	67	82 ,,
Upper Western	197	3	98 ,,
Lower Western	161	21	87 ,,
South Coast, Port Curtis	427	267	37 ,,
South Coast, Moreton	637	975	53 above
Darling Downs, East	277	223	19 below
Darling Downs, West	232	39	83 ,,
Maranoa	263	20	92 ,,
Warrego	193	24	88 ,,
Far South-West	133	7	95 ,,

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

MAY.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	6.13	5.17	Cairns	11	46	Longreach	28	42
6	6.16	5.13	Charleville	26	28	Quilpie	36	34
11	6.19	5.09	Cloncurry	38	61	Rockhampton ..	2	18
16	6.21	5.06	Cunnamulla ..	30	28	Roma	16	18
21	6.24	5.04	Dirranbandi ..	21	17	Townsville	11	38
26	6.27	5.02	Emerald	13	26	Winton	31	50
31	6.29	5.00	Hughenden ..	23	47	Warwick	5	3

TIMES OF MOONRISE AND MOONSET.

At Brisbane.

Date.	Rise.	Set.
	a.m.	p.m.
1	5.27	5.14
2	6.36	5·57
3	7.46	6.45
4	8·56	7.40
5	10.04	8.39
6	11.06	9.41
	p.m	
7	2.01	10.44
8	12.49	11.46
9	1.30	..
		a.m.
10	2.06	12.45
11	2.39	1.42
12	3.10	2.36
13	3.40	3.30
14	4.11	4.22
15	4.33	5.15
16	5.17	6.08
17	5·55	7.01
18	6.36	7.55
19	7.22	8.49
20	8.12	9.41
21	9.06	10.31
22	10.02	11.16
23	11.01	11.58
		p.m.
24	..	12.38
	a.m.	
25	12.01	1.15
26	1.00	1.51
27	2.01	2.27
28	3.05	3.05
29	4.11	3.45
30	5.21	4.31
31	6.32	5.23

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	16	23	32	39	8	14	36	45
6	10	29	26	44	0	19	28	52
11	16	23	32	39	8	14	36	44
16	25	13	42	29	17	3	49	32
21	29	11	44	25	19	0	52	28
26	22	17	38	33	13	8	44	37
31	12	28	27	43	2	19	30	51

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	22	38	46	56	30	41	20	33
3	11	48	38	62	23	48	11	40
5	6	52	36	65	20	50	7	44
7	7	49	36	63	21	49	8	41
9	13	42	40	58	25	44	14	35
11	22	37	46	56	30	41	20	32
13	31	28	52	49	36	34	26	24
15	41	18	57	43	42	28	34	17
17	48	10	63	38	48	23	40	11
19	53	5	67	34	50	20	44	7
21	52	5	66	34	50	20	43	7
23	46	9	61	37	46	23	37	10
25	41	18	57	43	42	28	34	17
27	30	30	51	50	35	35	25	25
29	19	41	44	58	29	43	18	34
31	9	48	37	62	22	48	9	40

PHASES OF THE MOON.

New Moon, May 1st, 11.16 p.m.; First Quarter, May 8th, 3.13 p.m.; Full Moon, May 16th, 12.52 p.m.; Last Quarter, May 24th, 2.02 p.m.; New Moon, May 31st, 6.49 a.m.

On May 16th, the sun will rise and set twenty degrees north of true east and true west, respectively; and on May 12th and 27th, the moon will rise and set at true east and true west, respectively

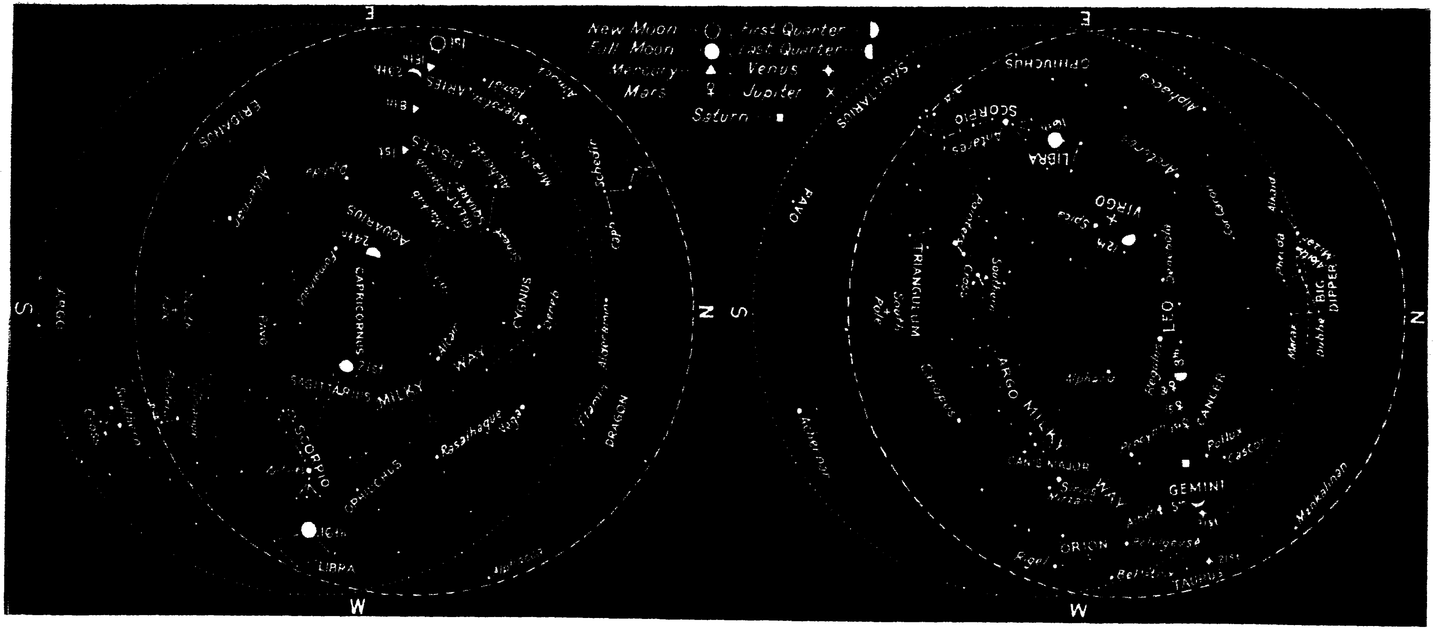
Mercury.—At the beginning of the month will rise about 2 hours before sunrise and at the end of the month will rise about sunrise and set at sunset, being in line with the sun on the 31st.

Venus.—May be seen in the western evening sky. At the beginning of the month it will set between 6.30 p.m. and 7.30 p.m., and at the end of the month between 7 p.m. and 8 p.m.

Mars—Will be observable in the western evening sky, setting just before midnight at the beginning of the month and between 10 p.m. and 11 p.m. at the end of the month.

Jupiter.—Rising about an hour before sunset at the beginning of the month, will be observable in the eastern evening sky. At the end of the month it will set between 2.30 a.m. and 3.30 a.m.

Saturn.—At the beginning of the month will set between 10 p.m. and 11 p.m. and at the



Star Charts.—Only the brightest stars are included and the more conspicuous constellations named. The stars, which do not change their relation to one another, moving from east to west, arrive at any chosen position about 4 minutes earlier each night. The positions of the moon and planets, which are continually changing in relation to the stars, are shown for certain marked dates. When no date is marked the position is for the middle of the month. When facing north hold N at bottom, when facing south hold S at bottom, and similarly for the other directions.

The chart on the right is as the stars will appear at 7.15 p.m. in the S.E. corner of Queensland at 8.15 p.m. along the Northern Territory border on May 15th. The chart at the left is for 10 hours later. On each chart the dashed circle is the horizon at Cape York, and the dotted circle is the horizon along the Southern Queensland border.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

MARCH RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Mar.	No. of years' re-ccrds.	Mar., 1945.	Mar., 1946.
North Coast.	In.		In.	In.
Atherton	9·08	42	23·32	10 61
Cairns	18·16	61	48·69	7 37
Cardwell	15·77	71	41·96	19 73
Cooktown	15·28	67	28·96	4·14
Herberton	7·93	57	16·33	8·56
Ingham	15·99	51	39·85	20·17
Innisfail	26·81	62	64·98	20·17
Mossman	18·75	19	54·17	4·91
Townsville	7·11	72	16·91	16·77
Central Coast.				
Ayr	6·37	56	15·60	13 15
Bowen	5·74	72	14·98	13·66
Charters Towers ..	3 71	61	7·46	7·35
Mackay	12·09	72	13·47	20·04
Proserpine	12·17	40	20·78	16·73
St. Lawrence ..	5·41	72	2·55	7·09
South Coast.				
Biggenden	3·98	44	1·01	2·34
Bundaberg	5·35	60	0·78	4·82
Brisbane Bureau ..	5 62	94	1·29	8·34
Caboolture	7·83	67	3·93	15·16
Childers	4·84	48	1·10	3·80
Crohamhurst.. ..	11·12	50	4·28	21·97
Esk	4·72	56	0·91	6·43
South Coast—cont'd.	In.		In.	In.
Gatton College ..	3·33	44	0·46	..
Gayndah	3·10	72	0·78	0 99
Gympie	6·13	73	3·00	7·83
Kilkivan	3·90	62	1·92	3·39
Maryborough ..	5·90	72	3·41	7·30
Nambour	9·41	47	5·18	22·11
Nanango	3·42	61	0·41	4·30
Rockhampton ..	4·48	72	1·28	4·40
Woodford	7 90	55	2·80	15 81
Darling Downs.				
Dalby..	2·74	73	0·54	1·04
Emu Vale	2·47	47	0·20	3·27
Jimbour	2·43	64	1·05	0·89
Miles	2·74	58	0·34	0·32
Stanthorpe	2·59	70	0·27	2·58
Toowoomba	3·78	71	0·65	4·21
Warwick	2·60	78	0·46	3·61
Maranoa.				
Roma .. .	2·72	69	0 11	Nil
St. George	2·15	62	0·03	0·68
Central Highlands.				
Clermont	3·16	72	0·50	4·55
Springsure	2·97	74	0·45	2·27

CLIMATOLOGICAL TABLE FOR MARCH.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure Mean at 9 a.m.	SHADE TEMPERATURE.		EXTREMES OF SHADE TEMPERATURE.				RAINFALL.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Coastal.									
Cairns	..	90	73	99	25	67	27	737	7
Herberton	..	83	62	91	11	54	27	856	8
Townsville	..	89	73	98	24	68	25,27,30	1677	7
Rockhampton	29·87	89	69	97	25	64	7		
Brisbane	29·88	82	66	94	9	56	28	834	16
Darling Downs.									
Dalby	..	84	59	93	10	42	27	104	6
Stanthorpe	..	76	53	85	10	37	13,27,28	258	7
Toowoomba	..	78	57	88	10	42	28	421	8
Mid-Interior.									
Georgetown	29·83	95	68	..	..	59	27	2	1
Longreach	29·83	95	67	103	9, 10	51	17	Nil	
Mitchell	29·95	87	58	95	10	43	27,28,29	20	1
Western.									
Burketown	..	96	72	105	23	59	27	17	1
Boulia	29·88	92	67	103	22	53	26	48	1
Thargomindah	29·95	88	63	99	7	49	26, 27	Nil	

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

Volume 62 Part 5

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

MAY, 1946

Issued by Direction of
THE HONOURABLE H. H. COLLINS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

PAGE.

Event and Comment—

The Department and the Farmer .. 259
New Poultry Legislation 260

Field Crops—

The Soil and Cultural Requirements of the Tomato 261

Applied Botany—

St. Barnaby's Thistle 271

Answers to Correspondents—

Sesbania Pea, Johnson Grass .. 273
Cobbler's Peg 273
Plants Identified 273
"Deadly Nightshade" 273

Plant Protection—

Notes on Fungicides for the Control of Tomato Foliage and Fruit Diseases 274
Water Blister Disease of Pineapples 278

The Dairy Industry—

A Water-cooling Tower for Milk and Cream Cooling on the Dairy Farm 279
Some Points in Herd Management .. 290
Production Recording 292
Queensland Show Dates 291

The Pig Farm—

The Marketing of Pigs 295

Poultry—

The General Farm Poultry Flock .. 297

PAGE.

Animal Health—

Nodule Worm Disease of Sheep 301
Colics of the Horse 304
Warts in Cattle 308

Agricultural Chemistry—

Water for Livestock 310

General Notes—

Staff Changes and Appointments .. 312
Open Season for Duck and Quail .. 312
Cessation of Bran and Pollard Rationing 312
Maturity Standard for Citrus Fruits 312
Peanut Board 312

Rural Topics—

Facts about Pigs 313
A Breeze from the Briny 313

Gadgets and Wrinkles—

A Bumper Bar Buffer 314
Teeth Tell the Age of Cattle .. 314

The Farm Home—

The Father's Share in the Care of His Children 315
In the Farm Kitchen 316
Queensland Weather in April 317
Astronomical Data for Queensland .. 318
Rainfall in the Agricultural Districts 320
Climatological Table for April .. 320

STATE'S SEEDS ARE GOVERNMENT TESTED

	Bushel s.	d.
BEANS—Brown Beautys ..	87	6
BEANS—Canadian Wonders	82	6
BLUE LUPINS, N.Z. ..	13	6
DUN FIELD PEAS ..	15	0
SEED BARLEY	6	6
SEED WHEAT	12	0
	lb.	
PUMPKINS—Beaudesert ..	5	0
PUMPKINS—Cattle ..	2	6
RAPE—Dwarf Essex ..	1	1
RAPE—Giant Kangaroo ..	1	2

ASK FOR YOUR REQUIREMENTS

Seed Potatoes

FAMOUS BATLOW
BLUE STAR
FACTORS
Government Certified and Sealed

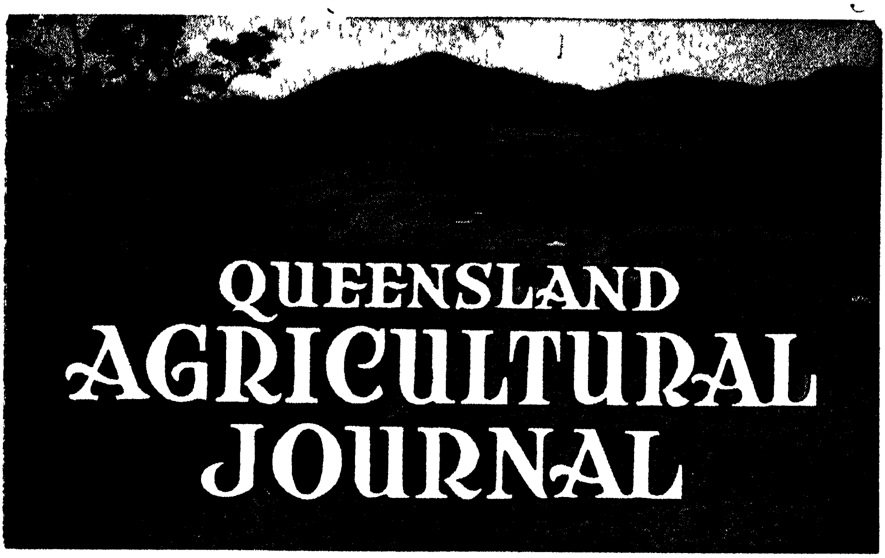
ALSO— RED STARS
At Fixed Prices—Delivery when Required
MAY, JUNE, JULY

also CARMENS, etc.

ORDER NOW

State Produce Agency Pty. Ltd.
ROMA STREET **BRISBANE**

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage General Public, **Ten Shillings,** including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Volume 62 1 MAY, 1946 Part 5

Event and Comment.

The Department and the Farmer.

IN the course of an address to the recent conference of the Queensland Farmers and Graziers' Council, the Minister for Agriculture and Stock (Hon. H. H. Collins) said that he was responsible for a department which had a body of men trained to tackle scientific problems affecting primary production, and the more the services of those officers were availed of by producers the better it would be for themselves and for the State. The Department existed solely to maintain, expand and improve agriculture, horticulture and animal husbandry and he invited the whole-hearted co-operation of producers with his officers in the solving of production problems

Continuing, Mr Collins said that the Government was facing the problem of land settlement and he had discussed with representatives of rural industry the number of additional settlers who could be placed successfully in various branches of primary production, but growers said that there were too many in their industries already 'Our forefathers did not accept that view, otherwise they would never have bothered about doing anything and the country would still be in its virgin state,'' commented Mr. Collins.

The Minister added that they had to realize that they lived in a country with an expanding population. They had to take some risk and recognize that the future would be what they made it. If they faced the future with the same courage as their boys had faced the enemy in the war, he had no fear as to the result.

Referring to price stabilization, the Minister thought they should learn from the sugar industry which, by applying the results of scientific research to the land and the mills, had increased production by fifty per cent., and during the same period had reduced costs by half. He suggested there was scope in the dairy industry for a more scientific approach to its particular problems. For example, production per cow in Queensland was the lowest of any of the four main producing States of the Commonwealth, although Queensland had some of the richest land. In the other States climatic conditions no doubt were more suitable for introduced pasture grasses and legumes, and southern farmers therefore had the benefit of experience in pasture research in oversea countries. Queensland was not in that fortunate position, but he believed they could develop pastures which would suit their conditions and would be comparable in value with introduced pastures in other parts of Australia. The production per cow was a challenge to the dairy farmers of Queensland to survey their breeding and feeding practices and methods of management.

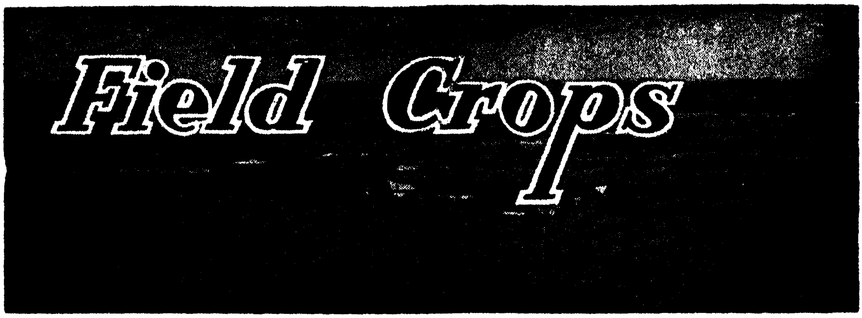
New Poultry Legislation.

AMONG the important new measures submitted to Parliament in the course of the recent Session was *The Poultry Industry Bill,* which was introduced by the Minister for Agriculture and Stock. In the course of his speech on the second reading of the Bill, Mr. Collins said that it was a consolidating measure under which pre-existing legislation relating to the control of the poultry industry would be repealed and new and broader principles established. To assess precisely the full value of the poultry industry to the State was not easy, for unlike other industries, its entire production was not sold through one marketing organization. Moreover, the production of household flocks throughout the State was obviously difficult to estimate. However, during the period of poultry food shortage when everyone who desired to share in the supplies available had to be registered it was possible to compute the poultry population, perhaps not quite accurately but near enough for all practical purposes. According to the closest calculation it was possible to make in the circumstances, the number of domestic fowls in the State, exclusive of ducks, turkeys, chickens and cockerels reserved for table use, approached 5 million. It was estimated that for 1945-46, commercially produced eggs in the limited controlled area would amount to 11 million dozen. The output of the industry in the uncontrolled area was assessed at 4 million dozen. Household production was not controlled in any area, but the production from this source was estimated at 5 million dozen. Thus the total egg collections approximated 20 million dozen.

The rapid expansion of the poultry industry in Queensland is shown by the fact that commercial egg production has more than doubled in the last decade. The industry last year was worth in round figures £1,900,000.

The new legislation provides for the establishment of a poultry advisory board; for the registration of stock supplies in order to control disease; a system of accredited hatcheries with the object of raising flock standards; proper certification of chicken sexers; control over the slaughtering of poultry and the licensing of premises used for that purpose; and, generally, complete control over matters affecting the poultry industry for which ample powers are contained in the measure. The Bill also provides for compensation where disease eradication necessitates the destruction of a poultry farmer's stock.

The new measure met with a favourable reception and commendation from both sides of the Legislative Assembly.



The Soil and Cultural Requirements of the Tomato.

L. G. VALLANCE, Chemist.

IN the selection of an area for tomato production, there are several important aspects to be considered. Difficulties in obtaining labour and inadequate transport and marketing facilities are factors which preclude the use of some otherwise suitable areas in outlying districts. Unsuitable climatic conditions also considerably reduce production in many districts, particularly those in which irrigation is not possible. Because of these fundamental restrictions, commercial tomato growing is tending to become an intensive and specialised industry, and areas suitable for production carry land values which are highly capitalised. The high cost of production, under such conditions, renders it necessary to maintain heavy yields of good quality fruit.

Soil Requirements.

Fortunately the tomato is fairly tolerant as far as soil conditions are concerned, and, providing weather conditions are satisfactory, it may be grown with success on a wide variety of soils. In Queensland, commercial production is carried out on both forest and scrub soils, the textures of which may vary from very sandy soils to sandy loams, loams, clayey loams or light clays. In general, the sandy loams and loams are to be preferred to those which are markedly sandy or clayey in nature. The reason for this is that the loamier soils are not so affected by the extremes of the climatic conditions, i.e. they do not become so dry in the dry weather nor so wet in the wet weather. Although excellent crops of tomatoes may often be grown on fairly heavy soils, the weather conditions must be particularly suitable. However, it very frequently occurs that these soils are either too wet or too dry to be worked into the tilth necessary for planting the fragile young tomato plant, with the result that the crop is planted too late or not at all. If a period of prolonged wet weather occurs particularly during the winter months, even a healthy, vigorously-growing crop may become a complete failure on a heavy soil which is badly drained.

Light coloured, very sandy soils should not be planted to crops which mature in the late spring or summer months as the plants will wilt badly during hot and dry conditions, unless ample irrigation is available. On the other hand, sandy soils which contain considerable amounts of organic matter, and are dark coloured and somewhat peaty in nature, are usually excellent all season tomato soils. It should be borne in mind that sandy soils, although they may be drained fairly readily by artificial methods, are not always naturally well drained. In deep sandy areas, the ground water level may rise considerably during the wet season with a consequent waterlogging of the zone occupied by the roots of the plants. Land which shows indications of being "spewy" should be avoided unless the provision of artificial drainage is economically possible. It also frequently happens that a shallow sandy surface soil overlies a sticky yellowish clay subsoil, and, during wet weather, the porous surface soil becomes saturated with water which cannot drain away because of the impervious nature of the clayey material underneath.

Therefore, soils that are loamy and which do not show any sharp change in texture from surface to subsoil, to a depth of at least two feet, are those which are most suitable for all season tomato production. Such soils may be cultivated within a reasonable period after rain, and, because of this, weed growth is more readily controlled than on the heavier types. However, on many properties, indeed on most properties, there exists not one type of soil, but many, and these may range through all the varying degrees of texture from light sandy to heavy clay loams. It cannot be too strongly emphasised that the successful grower is the one who deals with each soil type on its own merits. He plans ahead in order to ensure that the area which is most suitable for winter planting is the one which is planted for harvesting the spring crop. If he plants in the autumn it is on land which is not subject to frost in May and June, and which will not remain excessively wet should wet weather occur during the colder months of the year.

Plate 92.

ARTIFICIAL WINDBREAK MADE OF BRUSHWOOD.

Suitability of Location and Aspect.

The ideal location of a farm for tomato growing is one with a north to north-easterly aspect, protected from heavy wind, well drained and above frost level. Although many farms have portions of their area so situated, much of the land may have a less favoured fall or be low and subject to wet conditions and early frost.

Plate 93.

AN EXCELLENT ROW OF COW CANE ON A CLEVELAND FARM.

It is necessary therefore to plan carefully taking cognizance of all the relevant factors. Thus the best aspects should be reserved for winter plantings for at this time of the year there are inevitably some adverse factors and the crop is a very valuable one. The southerly and westerly falls should be used for the early autumn plantings when growing conditions are good and the ultimate crop is removed before the cold winds and frosts appear. Often the small farm holder is forced to use low wet ground in order to practice sound rotation and such land is most valuable for a late spring crop, as the weather is usually dry for a month or two at this time of the year.

Considerable mechanical damage may be done to a tomato plant by heavy winds which also by injuring the flowers have an adverse effect upon fruit setting. Badly misshapen fruit due to faulty pollination is often the result of wind. Though many growers on the coast are well

Plate 94.

SHOWING SERIES OF CANE BREAKS ACROSS FARM.

aware of the injury attributable to wind they do little to protect their crops, except at times when they preserve a small area of scrub or forest to serve as a natural windbreak. An excellent series of breaks may be made by growing rows of cow cane across the farm or on the headlands. The breaks may be planted at whatever interval is suitable for farm working, but 40 yards apart is commonly found suitable.

The cane may be pulled at the end of the season and used for feed and by the early autumn it has usually grown sufficiently high to protect the first new season's crop.

On many properties which are not affected by frost, Lady's Finger bananas prove most satisfactory for the purpose as well as providing a profitable sideline.

It is noticeable that the more compact bush types of tomato such as Rutgers, Pearson and Pritchard do not suffer from wind damage to nearly the extent as do the sprawling types such as Break o' Day and Red Marhio.

Importance of Organic Matter.

The fertility of any soil is closely linked with the amount of organic matter it contains. The decomposition of this material when acted upon by the minute organisms of the soil results in the formation of humus. Since humus has the power of absorbing many times its own weight of water, its presence in appreciable quantities results in an improvement of the drought-resisting properties of the soil. It is, therefore, highly desirable to increase the organic matter content of the lighter soils, in order to overcome the low moisture-holding capacities usually associated with these types.

Plate 95.

A YOUNG CROP OF POONA PEA WHICH RAPIDLY COVERED THE ENTIRE SOIL SURFACE AND VIRTUALLY ELIMINATED SUMMER WEED GROWTH.

On the heavier soils, organic matter in various stages of decomposition is materially effective in accelerating the downward movement of moisture with a consequent improvement in drainage. This is due to two causes: firstly, the presence of undecomposed plant residues provides channels and openings for the movement of water; secondly, the humus, which is the final product of the decomposition, has a chemical action on the clay particles and causes the formation of small aggregates or crumbs. These crumbs do not fit closely together, but are separated by cavities or pores through which the excess moisture drains away. This type of structure imparts a mellow, friable condition to the soil, and results in the good tilth which is so often sought after by the efficient grower.

Under the sub-tropical and tropical climatic conditions which are typical of the vegetable growing areas of this State the loss of humus begins almost immediately the virgin soil is broken up. Not only does continuous cultivation accelerate this process, but at the same time such essential operations as harvesting, spraying and general maintenance pound down the soil so that a good deal of its original structure is lost. Therefore, it is essential for the tomato grower at least to maintain, if not increase, the original content of organic matter, irrespective of the type of soil he is farming.

Green Manuring.

An effective way of replenishing the soil's organic matter is to grow cover crops expressly for incorporation in the soil. Cover cropping should be regarded as having an important place in any well regulated system of farm and soil management, and is just as essential as the application of fertilizer, provision of irrigation or other necessary practices. Moreover, the continuous use of weed-smothering green manures will ultimately result in the elimination of much useless and undesirable weed growth.

Plate 96.

AN EXCELLENT STRIKE OF POONA PEA FOLLOWING A SPRING CROP OF TOMATOES IN THE REDLANDS DISTRICT.

In Plate 95 is shown a young crop of Poona pea which rapidly produced a dense cover over the entire surface of the soil. An excellent strike of Poona pea planted in late November immediately after the completion of a spring crop of tomatoes in the Redlands district is illustrated in Plate 96. Another beneficial feature of many cover crop plants is their deep rooting habit. Their roots penetrate well below the normal cultivation depth and thus have an appreciable effect in improving the subsoil drainage.

There are a considerable number of plants which are suitable for green manuring, and the grower should select those which are known to grow satisfactorily in his particular district. It is not proposed in this article to discuss the various types of green manures in detail, and, if in doubt as to which variety or varieties to select, the tomato grower is strongly advised to communicate with this Department. A list of those which are in most common use is given below:

LEGUMES.

Summer Growing.—Cowpea (varieties Poona, groit, black, Victor), crotalarias (e.g., Gambia pea), velvet beans.

Winter growing.— New Zealand blue lupin, field peas, vetches or tares.

CEREALS.

Summer Growing.—Maize, Japanese millet, white panicum, setaria, Sudan grass.

Winter Growing.—Oats, rye, barley, wheat.

The Use of Farmyard Manure.

The value of farmyard manure for improving the fertility of soils used for tomato production is twofold. In the first place, when applied to the soil this material forms a valuable source of organic matter for conversion to humus by the soil organisms. In addition, it contains an appreciable amount of plant food materials which becomes available to the plant as decomposition takes place. The analyses of some average air-dried samples of farmyard manure are given in Table 1:

TABLE 1.

PLANT FOOD CONTENT (PER CENT.) OF FARMYARD MANURE.

Manure.	Water.	Nitrogen.	Phosphoric Acid.	Potash.
	Per cent.	Per cent.	Per cent.	Per cent.
Fowl	60	1·2	1·0	0·75
Horse	76	0·5	0·3	0·4
Cow	84	0·3	0·2	0·1

It will be seen that, although fowl manure contains more nitrogen, phosphoric and potash than either horse or cow manure, the amounts present are relatively small when compared with the recommended tomato fertilizer, which contains approximately 4·5 per cent. nitrogen, 13·5 per cent. phosphoric acid, and 6 per cent. potash. In comparison with a formula of this type fowl manure is markedly deficient in phosphoric acid and potash, and, moreover, if heavy applications are made in order to overcome these deficiencies it will be found that far too much nitrogen will be added and that unsatisfactory growth will result.

For those growers who have large quantities of fowl manure available, it is suggested that about 45 lb. of superphosphate (containing 20 per cent. phosphoric acid) be added to every 500 lb. of fowl manure.

This mixture will then be approximately equivalent to 100 lb. of a commercial mixture of the formula 4·5-13·5-6, insofar as the content of nitrogen and phosphoric acid is concerned; a further addition of approximately 4½ lb. of muriate or sulphate of potash would be required to make it equivalent in potash.

Plate 97.

A CONVENIENT METHOD OF STORING FARMYARD MANURE GATHERED FROM THE GROWER'S PROPERTY.—A roof or covering should be provided for protection from wet weather.

Because of the very small plant food content of horse and cow manure, the chief value of the use of those two substances is to supply organic matter for conversion to humus by the soil organisms. When broadcast and ploughed in, amounts up to 20 tons per acre are not excessive, provided they are turned into the soil some time before planting. When the manure has been heaped up and allowed to rot for several months a period of two to three weeks only is necessary between time of application and planting. Fresh manure, which is often in a lumpy condition, may require from one to three months to decompose in the soil, the period depending upon weather conditions as regards temperature and moisture. In general, it is most convenient to store the material in a heap (Plate 97) as it is gathered, and allow it to rot until required for use. In order to avoid loss of plant foods by leaching during heavy rain, it is desirable that a roof or covering of some kind should be provided.

The Use of Lime and Dolomite.

Many tomato growers are well aware of the beneficial effect obtained where materials containing lime or magnesia have been applied to certain types of soil. Some confusion exists, however, as to what actually happens when lime or dolomite (which is lime plus a certain amount of magnesia) is mixed with the soil and why this improvement occurs on some soil types and not on others. The effects produced by either of these two substances may be briefly summarised as follows:

(*a*) The correction of excessive soil acidity by neutralising soil acids;

(*b*) Altering the physical nature of the soil and producing a mellow, more friable condition;

(*c*) Providing lime and magnesia for use as plant food, since these two substances themselves are essential for plant growth.

Fortunately the tomato plant is rather tolerant as far as soil acidity is concerned, and may be grown successfully even on soils which are too strongly acid for many other crops. However, continuous cultivation, particularly under irrigation, accelerates the loss of such acid correcting substances as lime and magnesia. Furthermore, the use of acidic fertilizers such as ammonium sulphate also tends to increase acidity and after several years continuous use soil acidity may be built up to a degree which prevents the optimum growth of the plant. Such a condition may be quickly and satisfactorily corrected by an application of lime or dolomite. If a grower is in doubt as to whether his soil needs either of these two materials for the correction of acidity, a soil test is a very useful guide. This Department has the facilities for carrying out this test and the grower is urged to seek advice either directly from this office or through his district Advisory Officer.

It should always be borne in mind that, although the tomato plant can withstand fairly acid conditions, a high degree of acidity is particularly unfavourable for the growth of most green manure crops. It is also injurious to the minute soil organisms whose presence is essential for the conversion into humus of the ploughed-in residues of these plants. The presence of a high concentration of soil acids will prohibit the rotting of vegetable matter to such an extent that the value of green manure may be reduced to almost negligible proportions. This will cause a considerable decline in soil fertility, particularly on those soils which must, of necessity, be planted to cash crops in almost continuous succession. Therefore, an occasional dressing of lime or dolomite in conjunction with a green manuring programme will considerably assist in maintaining the humus content of intensively cultivated soils. With the exception of the very sandy types, soils which are deficient in humus are usually difficult to prepare and bring to the good tilth necessary for tomato culture.

In addition to their beneficial effects on the tilth of the soil by creating conditions favourable for the manufacture of humus, lime and dolomite also have a direct chemical effect on the clay particles which are present in all soils. These minute particles which occur in considerable proportion in the heavier soils become aggregated, i.e. large numbers of them join together forming small lumps or crumbs. When in this condition, the soil does not set or form large clods and the drainage is considerably improved. Soils which are "sour," i.e. those of low lying areas which remain wet and practically waterlogged for long periods, have often been reclaimed by heavy dressings of lime or dolomite, providing a system of artificial drainage is put in at the same time. This drainage, of course, is necessary to carry away the water which will be freed from the soil as a result of the improvement in physical condition. Unlike an analysis for soil acidity there is, unfortunately, no chemical tests which will indicate the necessity for lime as far as soil tilth is concerned. If a soil is not highly acid but is cloddy and difficult to work, a dressing of lime or dolomite will often create an appreciable improvement, particularly if for the next year or so green manuring is carried out in rotation with cash crops.

Lime and magnesia, as well as being soil improvers, are also, in themselves, important plant foods, and herein lies the only essential difference in the use of lime and dolomite. If a soil is deficient in magnesia, dolomite must be used since it alone contains magnesia. On the other hand, should the soil be deficient in lime, then either lime *or* dolomite could be used, since the latter contains both lime and magnesia, usually in about equal amounts. Fortunately, however, practically all Queensland soils which are suitable for tomato growing contain sufficient amounts of these two substances to supply the plants' requirements, even after being cropped for a large number of years. The amount of lime and magnesia taken up by the plant is small in relation to the actual amounts present in most soils. In general, then, the application of lime or dolomite is mainly necessary to correct soil acidity and to improve the physical condition. Since either of these materials is equally effective in these respects the question of which to use is simply a matter of which is most easily procurable, having due regard to their cost and purity.

Neutralising Value.

Lime may be purchased in several forms, all of which are suitable for agricultural purposes. Dolomite is available in one form only. The various commercial lines are as follows:

(*a*) Agricultural lime (carbonate of lime);

(*b*) Dolomite (carbonate of lime plus carbonate of magnesia);

(*c*) Burnt or quick lime (oxide of lime);

(*d*) Slaked lime (mixture of hydrated oxide and carbonate of lime).

The power of these substances to neutralise acidity is termed the "neutralising value." In order to create a standard for comparison purposes, the neutralising value of one hundred per cent. pure agricultural lime, i.e. carbonate of lime, is taken as 100. If it contains impurities, the value will be less and in order to indicate this fact to the grower the neutralising value is printed on the label attached to the bag. Supposing, for instance, a grower were able to obtain two samples of agricultural lime at the same price, one of which had a neutralising value of 90 and the other of 80, the former would be preferable, since it would take 9 tons of the latter to have the same effect as 8 tons of the higher grade lime. This same system of evaluation may be applied to dolomite, which is very similar in neutralising value to agricultural lime. Burnt or quick lime has a higher value than agricultural lime, whilst slaked lime is also higher, but slightly less than burnt lime. One ton of burnt lime with a neutralising value of 160 would be equivalent to 2 tons of agricultural lime or dolomite, with a value of 80. Therefore, if a grower has the choice of several sources of lime, or dolomite, a consideration of the neutralising value stated on the label, in conjunction with the price, will enable him to make the most economic purchase.

A further point to be considered in the purchase of lime or dolomite is its degree of fineness. Since these substances do not dissolve in water, it is necessary for them to be in a very fine powdery state for the maximum reaction to occur when mixed with the soil, and moreover, the speed at which this takes place is practically entirely dependent upon the fineness. Because the process of burning lime results in a very finely grained product, burnt lime has a much more rapid action than agricultural lime or dolomite. Since slaked lime is simply burnt lime which has been exposed to the air, it is also very powdery and quick-acting. In general, however, agricultural lime and dolomite are ground to a satisfactory state of fineness before being placed on the market, since it is required by law that the degree of fineness be declared on the label. As a general approximation, it may be stated that burnt or slaked lime will be effective in about a month after application, while a good agricultural lime or dolomite will require from two to three months.

When considering the application of lime or dolomite to tomato soils, it is not possible, nor is it necessary, to be very specific as to the amounts to be supplied. The amounts set out in Table 2 will be found to be generally satisfactory.

TABLE 2.

SHOWING REQUIREMENT, IN TONS PER ACRE, USING GOOD QUALITY AGRICULTURAL LIME OR DOLOMITE.

Degree of Acidity.	Sandy Soils.	Loams.	Clay Loams.
	Tons per Acre.	Tons per Acre.	Tons per Acre
Fairly acid	1	1½	2
Strongly acid	1½	2	3

These amounts are based on the use of good quality (neutralising value approximately 100) agricultural lime or dolomite. If materials with lower values are used it would be advisable to increase the amounts proportionately. Should the grower desire to use burnt or slaked lime, in order to obtain quicker results, the rate of application per acre should be decreased according to the increased neutralising values. For instance, if the burnt or slaked lime had a neutralising value of 120 then the amounts required would be 10/12ths of the amount given in Table 2. Again, if the neutralising value were 160, it would only be necessary to use 10/16ths of the quantities shown above for agricultural lime or dolomite.

THE CASE FOR COUNTRY INDUSTRIES.

Farmers in the southern States are making a bold bid for decentralisation of industries and, as a natural corollary, decentralisation of population. In Victoria, a strong organisation known as the Victorian Decentralisation League has already put up a comprehensive case for its objectives which are largely in line with those of the New Deal for the West movement in Queensland.

Decentralisation depends, obviously, on the establishment of secondary industries in country towns, preferably industries which employ a large number of men. Many factors necessarily have to be considered in connection with such an industrial movement to inland areas. Included in those factors are transport (railway freights, accessibility, and so on); ample water and electricity supplies at reasonable rates; and provision of the amenities of modern life.

Some degree of decentralisation was forced on us during the war when important munition works were removed from what were then regarded as vulnerable places close to the coastal cities. As a result of that partial decentralisation, great impetus was given to country towns in which wartime factories were located, and that meant an increase in local population and better nearby markets for food producers. For the good of the nation at large it is felt that this movement away from the one big city should not be allowed to go too far into reverse, where it has already slowed down since the war ended. It would certainly be a great thing if wartime factories could be turned over to peacetime production in country towns.

APPLIED BOTANY

St. Barnaby's Thistle.

C. T. WHITE, Government Botanist.

MANY farmers on the Darling Downs have become alarmed at the spread during the past two or three years of a thistle with yellow flowers and very spiny seed heads, and a number of specimens have been received at the Department for identification and report. It proved to be a weed for which the name St. Barnaby's Thistle has been proposed as the standardised English name in Australia. It has long been naturalised in the Southern States, and is perhaps best known as Yellow Cockspur, a name it shares with a closely allied plant. It is also known as Saucy Jack.

The accompanying illustration will enable farmers and pastoralists to recognise the plant should it make its appearance on their properties. It has recently been declared a noxious weed throughout the State.

Description.—A stiff branching thistle, 1-2 feet high or more, the stem and leaves clothed with white, close, rather cottony hairs; basal leaves lobed, 3-4 inches long, but only seen in the younger plants, stem leaves narrow, 1-2 inches long, continued at the base into a narrow wing running down the stem. Flower heads ("flowers") yellow, single at the ends of the branches, enclosed in a number of bracts, some of them ending in long spreading yellow spines ½-1 inch long or even slightly more. "Seeds" light brown, shining, about an eighth of an inch long and surmounted by a white tuft of hairs slightly longer than the seed itself.

Country of Origin.—Central and Southern Europe.

Common Names.—St. Barnaby's Thistle, Yellow Cockspur, and Yellow Star Thistle. The origin of the first name, which the Council for Scientific and Industrial Research recommends as the standard local name, is that in Europe it comes into flower about midsummer, somewhere about St. Barnaby's Day, 11th June.

Properties.—It is not known to possess any poisonous or harmful properties and in its young stage is eaten by stock to some extent. It soon becomes, however, harsh and unpalatable.

Eradication.—It is an annual weed of harsh wiry growth, and hand-chipping or cutting off below the surface of the soil by any means is the most satisfactory method of eradication. Usually it is possible to deal with the plant by this method.

---

* *Centaurea solstitialis.*

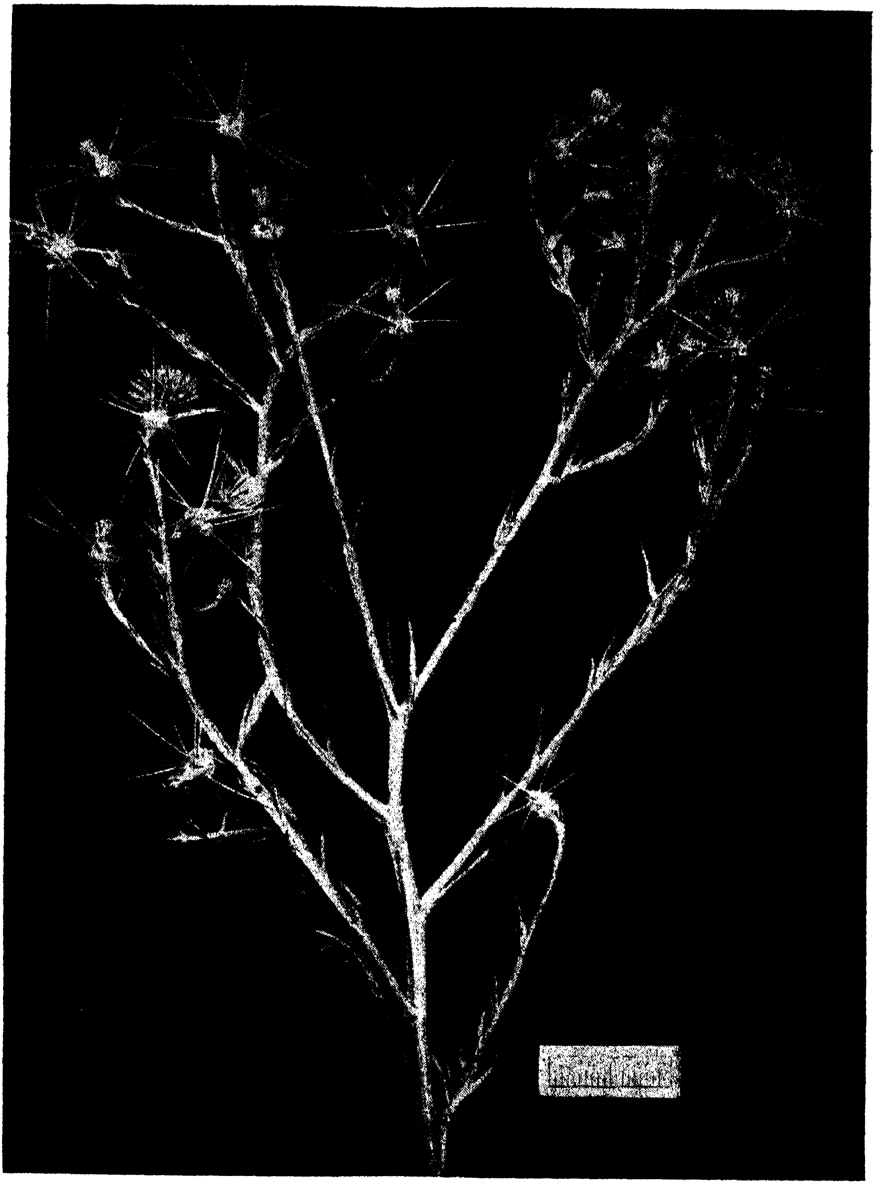


Plate 98.

ST. BARNABY'S OR YELLOW COCKSPUR THISTLE.

ANSWERS.

(Selected from the outgoing mail of the Government Botanist.)

Sesbania Pea—Johnson Grass.

Inquirer (Proston)—

1. Sesbania Pea or Gulf Pea (*Sesbania aculeata*). This plant sometimes comes up in great abundance, particularly on rather damp land. It is not known to possess any poisonous or harmful properties at any stage of its growth. The seed might have some value as a poultry feed.
2. Specimen very immature, looks like Johnson Grass (*Sorghum halepense*). Johnson Grass is a very serious pest of cultivation because of its underground runners, which, when cut up into small pieces, are capable of forming many new plants. It is quite a good fodder, relished by stock, but like other members of the Sorghum family contains a prussic acid yielding glucoside and some care should be exercised in feeding it off. Cattle should not be allowed to gorge on it on an empty stomach.

Cobbler's Peg.

O.C. (Macalister)—

The specimen is the cobbler's peg (*Bidens pilosa*), a very common farm weed in coastal Queensland. It mostly occurs as a weed of cultivation or grows on disturbed land. It is very common in vacant town allotments and is not known to possess any poisonous or harmful properties. It is doubted if the plant will become a serious pest in the West and the seeds would be comparatively easy to treat in wool.

Plants Identified.

R.D.C. (Rockhampton)—

1. *Myoporum acuminatum*, Strychnine Bush. Feeding tests definitely showed this plant to be poisonous to stock. Constipation and bloody faeces are generally a feature of *Myoporum* poisoning.
2. *Eremophila maculata*, Fuchsia Bush. Stated that prussic acid poisoning seemed to be indicated. In that case, this bush is the most likely cause of the trouble. It contains a prussic acid yielding glucoside which at times rises very high. At other times, ordinary paddock resting stock may feed on the plant with comparative safety.
3. *Zygophyllum apiculatum*, Gallweed. Suspected as poisonous but feeding tests have always given negative results.
4. A poor specimen, but probably *Ehretia membranifolia*, a common tree in the mixed scrubs of Central Queensland. No common name for it is known.
5. *Erythroxylon australe*. This plant belongs to the same genus as the one which produces cocaine, but is not known to possess this drug nor to have any harmful properties.
6. *Terminalia oblongata*, Yellow-wood. Causes staggers in stock.
7. *Acacia* sp. It is difficult to name species from leaves only.
8. *Kochia tomentosa*, Cotton Bush. Generally regarded as a comparatively reliable fodder in times of drought.
9. *Santalum lanceolatum*, Damson or Plum-wood. A good fodder.
10. *Enchylaena tomentosa*, Barrier Saltbush. Generally regarded as a good fodder.
11. *Arundinella nepalensis*. A native grass for which no common name is known. It is very common on hillsides in forested country, but is not confined to such localities. It is rather a wiry grass and not of much value as a fodder.
12. *Leptochloa digitata*, Cane Grass. This grass contains a small amount of a prussic acid yielding glucoside but is unlikely to cause trouble.

"Deadly Nightshade."

A.V.F. (Bundaberg).

The specimen is *Solanum Seaforthianum*, commonly cultivated as a garden climber in Queensland gardens. It has run out and become naturalized as a weed in some scrub areas, and is popularly known as deadly nightshade, though it is not the same as the plant known under that name in Europe. The plant has been proved by feeding tests to be poisonous to stock.

LANT PROTECTIO

Notes on Fungicides for the Control of Tomato Foliage and Fruit Diseases.

J. E. C. ABERDEEN, Pathologist.

DURING the period 1937-1941 a number of experiments on the control of tomato diseases by fungicides were carried out by this Department, principally in the Redlands district. The results were published quarterly in the "Queensland Producer" under "Report of Tomato Pathologist," but no summary combining the results of all the trials and observations has been issued. These notes are based principally on the above experiments but also include the results of a further trial made by this Department in 1944, and one made by the Department of Agriculture, New South Wales, in 1941.

Bordeaux mixture of 4-4-40 strength is the long established treatment for the control of tomato foliage and fruit diseases. Consequently, in all the experiments, this spray has been used as the standard with which the other fungicides were compared.

The principal disease used in making these comparisons has been that which is usually known as target spot in Queensland, but often called early blight in other countries. It may have been expected that the more spectacular Irish blight would have been used, but this was not possible as that particular disease was almost entirely absent in the experimental plots. The chief reason for this absence is believed to be the relatively greater susceptibility of Irish blight fungous spores to copper fungicides in general, because it was known that this disease was active during several of the seasons in which the trials were made. Combining this observation on the experimental.areas with more general ones over other districts it is considered that any of the copper fungicides used in these trials, with the possible exception of the copper carbonate spray discussed below, will effectively control Irish blight if applied regularly, i.e., every seven to ten days, and thoroughly. In the case of target spot, however, differences become apparent particularly between the dust and spray methods of application.

Home-made Spray Mixtures.

Two home-made sprays are considered worthy of mention here—the Bordeaux 4-4-40 mixture and the home-made cuprous oxide spray. The home-made cuprous oxide spray is already established as a substitute for Bordeaux on citrus. On tomatoes it was found to be quite as efficient as Bordeaux 4-4-40 in disease control, and possessed the advantage that in the large majority of the experiments the plants treated with this spray gave much higher yields than those treated with Bordeaux. For two unpruned crops grown in spring the yields were approximately equal but for the other five trials the cuprous oxide gave increased yields of 10, 17, 22, 25 and 28 per cent. On these results, if a grower is going to mix his own spray, then home-made cuprous oxide mixture is recommended. The method of mixing this spray is not discussed here but new growers desiring such information will be supplied with it on request.

Commercial Spray Mixtures.

Two types of commercial spray mixtures are available. The first group are those containing insoluble copper compounds, i.e., cuprous oxide, copper oxychloride, basic copper sulphate, and basic copper carbonate. In contrast to bluestone (copper sulphate crystals), which dissolves completely in water and must be neutralised with hydrated lime to prevent destruction of the plant foliage, these compounds are completely insoluble in water and require no neutralising agent before being applied to the plant foliage. They all contain 50 per cent. copper. Those of the second group resemble a Burgundy mixture and contain copper sulphate, washing soda and lime. These usually contain 12½ per cent. copper.

In the Queensland trials all sprays were used at such a strength as to give an amount of copper per 40 gallons equivalent to that contained in the copper sulphate (bluestone) required to make up the same quantity of 4-4-40 Bordeaux mixture. In the first group of sprays this meant using 2 lb. per 40 gallons of water, while the second group required 8 lb. per 40 gallons.

The cuprous oxide spray was used in the greatest number of trials and was found to be quite as effective as Bordeaux in disease control, but, like the home-made cuprous oxide, resulted in higher yields. However, owing to packing difficulties this spray has gone off the local market.

Copper oxychloride, however, is now available and makes quite an efficient spray. In the New South Wales trial it was not quite equal to Bordeaux 4-4-40 in the control of target spot, but the increased yield from the plants treated with copper oxychloride more than compensates for this. The Queensland trials gave no information on disease control but also demonstrated the increased yield. In the three experiments from which information is available the increase over Bordeaux 4-4-40 was 12, 27 and 30 per cent.

Basic copper sulphate was available prior to the war, but at the moment has not yet reappeared on the local market. Experimental evidence on this compound is hardly sufficient as yet. What there is, coupled with observations made on growers' crops where this material has been used, indicates that it should be in much the same class as the oxychloride.

A basic copper carbonate spray used in the very early trials did not give satisfactory results. The main reason for this was that it had not been specially prepared for spray purposes and would not maintain its suspension in water, resulting in a very uneven coverage of the tomato bush and poor control of target spot.

In general it can be accepted that these insoluble copper compounds make a satisfactory spray, providing they have been prepared for that purpose. The grower can readily check this by mixing some of the material with a little water. Obvious settling of the spray material and clearing of the liquid above in two or three minutes indicates that the material is unsuitable.

The Burgundy type of spray was used in only one trial. Disease control was good, equal to that of Bordeaux, but the effect on the plant was too severe at the strength equivalent to 4-4-40 Bordeaux. Experiments on the use of weaker strengths may increase the usefulness of these mixtures.

Copper Dust Mixtures.

There are two types of copper dust mixtures on the Queensland market. They are copper sulphate (dehydrated) with hydrated lime as the neutraliser and filler, and basic copper carbonate with kaolin or similar material as a filler.

General observations suggest that both these dusts will give an adequate control of Irish blight under normal conditions, but experiments indicate that they are inferior to the sprays in the control of target spot. This is illustrated by the results from an experiment when the average loss of fruit due to target spot from the plants treated with three different sprays was 11 per cent. while the average loss from plants treated with two different dusts was 23 per cent.

Comparing one dust with the other the copper sulphate-hydrated lime mixtures gave slightly better figures for control of target spot than the copper carbonate-kaolin, but in no one experiment was it definite. The latter dust, however, is less injurious to the plant, and as a result plants treated with copper carbonate mixture gave yields up to 20 per cent. greater than from those treated with copper sulphate mixtures.

A copper oxychloride dust was included in the 1944 trial, but disease incidence was insufficient to estimate its efficiency. The effect on the plant was of the same order as the copper carbonate dust.

On these results copper carbonate dusts are recommended. It should be mentioned here that it is uncommon to use straight copper carbonate-kaolin dusts, as the wide occurrence of tomato mite justifies the inclusion of a percentage of sulphur at all times. Consequently commercial dusts almost invariably contain sulphur, and lead arsenate is added when required for tomato grub control.

Relative Costs.

In estimating the cost of treating a tomato crop with fungicides there are two aspects to be considered, first the cost of the materials and second the cost of labour for application.

The cheapest way to purchase materials for a copper fungicide is in the form of copper sulphate crystals (bluestone) and hydrated lime. With these materials it costs approximately 1s. 9d. to make up 40 gallons of Bordeaux 4-4-40 mixture. To obtain the same amount of copper in a ready-mixed dust, the dearest form in which it can be purchased costs approximately 6s. The cost of a dust thus appears relatively high, but to offset this approximately 20 man hours must be allowed to spray an acre of full-grown tomato plants (using knapsacks), while it only takes approximately 8-10 man hours to dust the same area. In estimating rates of working it is obvious to most growers that there is a considerable variation between individual workers, so the above figures were based on the working figures of six recognised tomato growers and the writer's own times for application of the different treatments. From the above figures it can be seen that if the labourer's time is worth 2s. or more per hour, then dusting is cheaper. It must be emphasised here, however, that, in the case of tomatoes, efficiency in disease control and effect on total yield of the crop are usually more important considerations than the original costs of the material and its application.

Plant Injury.

The plant injury discussed here is not of the type usually associated by the grower with damage by sprays. Very often the average observer would not notice any differences between the treatments, though sometimes the more extreme cases show a slight tendency towards a leaf curl and the plants, after several weeks, may be slightly stunted.

As a result of experiments in the United States of America it was found that there were three likely reasons for the stunting of plants by a fungicide. These may be simply stated as follows:—(i.) The spray is too acid or too alkaline; (ii.) an excess of lime is injurious in itself; (iii.) the damage is increased with the increase in the total amount of chemicals applied to the plant.

Bordeaux mixture is an offender under all three headings as compared to home-made cuprous oxide and the insoluble copper compounds. The Burgundy type of spray is in the same class as Bordeaux.

When comparing copper carbonate dust with copper sulphate dust, however, it is found that the total amount of chemicals used is the same, but the sulphate dust contains an excess of hydrated lime and is thus also very alkaline. From these considerations it appears that the lime is the chief factor in reducing total yields of fruit. Thus, wherever possible, this material should be avoided in making up dust mixtures.

An interesting lead for future work arises from the New South Wales trial. Bordeaux mixtures of the strength 1-1-40 and 2-2-40 were used in comparison with Bordeaux 4-4-40 and copper oxychloride spray, and were found to give no more injury to the plants than the oxychloride and still be slightly more efficient than the latter in controlling target spot. No definite recommendations can be made for the present, but future experiments will probably consider this aspect of the work.

Conclusions.

The following recommendations are made:—

(i.) If the grower anticipates a heavy infection of target spot, then a wet spray should be used.

(ii.) If a wet spray is to be used and the grower desires to mix his own, then home-made cuprous oxide is recommended.

(iii.) If requiring a commercial spray, then the copper oxychloride product is the best of those available at present.

(iv.) If the grower decides that a dust is required, then copper carbonate-kaolin mixtures are recommended.

Water Blister Disease of Pineapples.

T. McKNIGHT, Assistant Pathologist.

MANY pineapple growers this season have suffered severe losses as a result of water blister disease occurring in their southern consignments.

An inspection of a number of representative farms has led to the obvious conclusion that many growers do not yet grasp the fact that infection of fruit with the water blister fungus occurs on their own plantations mainly from spores originating from nearby dumps of infective material and from the floor of the packing shed. Where growers have had considerable water blister losses, inspection of their packing sheds has shown that neglect or carelessness in the disposal of discarded tops, leaves, fruit, knobs and other trimmings has been responsible for the infection of the fruit.

This year, in February and March, the relatively high temperatures coinciding with more than usually abundant moisture have enabled the water blister fungus to enter and rapidly rot this discarded material, and at the same time form countless numbers of spores on the surface. These spores are carried in the air and germinate, like seeds of higher plants, after gaining entrance to the fruit through abrasions and bruises on the sides and shoulders of the fruit or through the stem end and occasionally through the broken top.

Provided fruit receive careful handling during picking and packing operations, it is only necessary to see that no infective material is left lying in or around the packing shed to ensure that wastage from water blister is reduced to very small proportions, if not entirely eliminated.

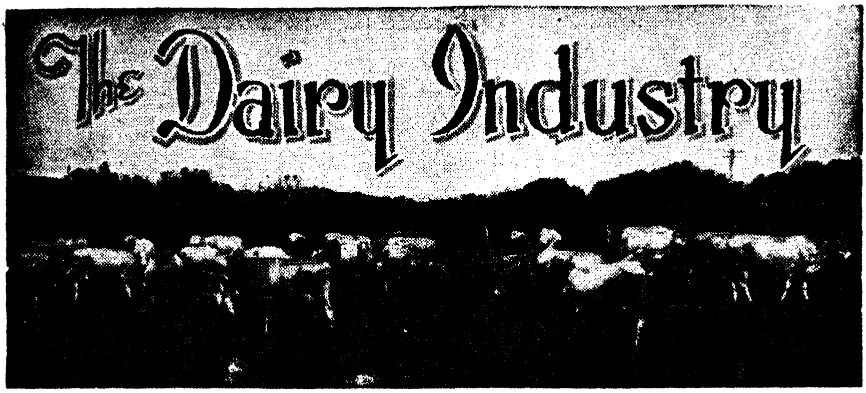
Growers who have had water blister in this year's consignments are therefore urged to dispose of dumps of discarded pineapple material by burying or burning and to spray their contaminated sheds thoroughly with a 5 per cent. solution of formalin. It may be noted that packing sheds with dirt floors are not as easy to keep clean and are more difficult and costly to sterilize than those with wooden or concrete floors. From then on growers must adopt a routine for the disposal of discarded tops and other material and maintain a high standard of hygiene in and around the packing shed.

This strict, but simple, maintenance of hygiene associated with careful handling of fruit and the rejection of cracked, sun-burned, "weeping" and "knobby" fruit are the measures adopted by careful growers who rarely receive a report of water blister disease in their southern consignments.

TO SUBSCRIBERS.

Kindly renew your subscription without delay. Write your full name plainly, preferably in block letters.

Address your subscription to the Under Secretary, Department of Agriculture and Stock, Brisbane.



A Water-cooling Tower for Milk and Cream Cooling on the Dairy Farm.

F. G. FEW, Division of Dairying.

A RAPID deterioration in the quality of milk or cream produced on the farm soon follows unless means are available for the immediate cooling of the product while milking operations are in progress. The farmer's problem is, in fact, twofold. Firstly, there is the initial cooling while the herd is being milked, and secondly, the holding of the cans at a desirable temperature while awaiting transport from the farm.

On a farm supplying whole milk ideal results are unattainable under average Queensland conditions without the use of refrigeration, as the necessary temperatures to ensure no deterioration in quality are below those which can be produced by purely natural means. Similarly, for the holding of cans of milk, refrigeration is alone perfectly satisfactory.

In the case of cream, the temperature necessary to ensure satisfaction may be higher, and 70 deg. F. allows a desirable degree of ripening to occur in a cleanly produced product for butter-making by Australian manufacturing methods.

The holding period of cream on a farm is often considerable, and a satisfactory method of doing this was described in detail in the May, 1945, issue of this Journal. As mentioned in that article, the initial cooling of the cream immediately after separation is a necessary and additional requirement. The cost of a refrigeration unit for the ideal cooling and holding of whole milk on a farm is, unfortunately, too high to allow of its general introduction. The milk supplied may be either for the whole milk trade or for cheese manufacture. In the former case, the holding period is definitely limited, and the main problem in this instance is the immediate cooling of the milk to as low a temperature as can be obtained by methods other than refrigeration. For cheese manufacture, the holding period in the case of the morning's milk is likewise definitely limited, but the evening's milk may be held for 12 hours or so before despatch to the factory. Generally, however, night temperatures are below that to which the milk can be cooled by natural means, and so no improvement could be expected by the use of a charcoal cool cabinet, such as previously recommended for cream stored during the hours of the day.

The problem as far as milk-producing farms are concerned is thus to cool the milk during milking operations to as low a temperature as is possible by the use of natural and readily available means. Similarly, the remaining problem for cream suppliers is to quickly cool the cream to about 70 deg. F. and then place the cans in a charcoal cooler when the cans are to be stored during the day time.

In the absence of any naturally occurring cold water supply, the principles of evaporative cooling can often be utilised to very good effect. Quite a useful degree of cooling may be expected in most dairying areas, apart from those on the immediate coastal strip. As explained in the article on charcoal coolers, the existing wet-bulb temperature is the limiting factor in the degree of cooling possible by natural evaporative means. This is the lowest temperature to which water could be cooled on the farm without the use of refrigeration. While its value varies considerably, both from day to day and throughout any particular day, it does not exceed 70 deg. F. over quite a proportion of the dairying areas of this State. The natural cooling of water by self-evaporation to this temperature is thus quite practicable in these areas and, while entirely suitable for cream cooling and storage, this temperature also represents a valuable degree of cooling for freshly drawn milk, especially if transported to the factory within a short time.

The following particulars supplied by courtesy of the Meteorological Bureau show the average wet-bulb temperatures at the stated hours, and also the months when the average reading exceeds 70 deg. F. The blanks indicate that no regular readings are recorded at the given hours:—

Place.	Average Wet-Bulb Temperature for January.		Months when the Average Wet-Bulb Temperature is 70°F. or Over.	
	At 9 a.m.	At 3 p.m.	At 9 a.m.	At 3 p.m.
	°F.	°F.		
Atherton	69·4	. .	None	. .
Brisbane	70·9	71·8	January and February	December, January, and February
Bundaberg	72·6	73·5	December to March (inclusive)	November to March (inclusive)
Cairns	76·7	78·5	October to April (inclusive)	September to March (inclusive)
Dalby	67·9	69·9	None	None
Gayndah	71·4	73·0	December, January, and February	November to March (inclusive)
Gatton College . .	71·6	. .	January and February	. .
Gympie	72·1	. .	December to February (inclusive)	. . . .
Herberton	68·0	. .	None	. .
Ipswich	70·9	. .	January and February	. .
Miles	69·8	. .	None	. .
Mitchell	67·4	68·8	None	None
Pittsworth	65·8	. .	None	. .
Rockhampton . .	73·2	74·9	November to March (inclusive)	November to March (inclusive)
Toowoomba . .	65·7	. .	None	. .
Townsville	75·8	76·9	October to April (inclusive)	October to April (inclusive)
Warwick	65·9	. .	None	. .
Westwood	72·3	. .	December to March (inclusive)	. .

At all places the averages for January are the highest for any month of the year, the values during the cooler months of the year being, of course, considerably lower. The tables show that irrespective of the ordinary shade temperatures, water can be cooled by evaporation alone to the values given in the table, even during the hottest month of the year.

Areas on the immediate coastal strip are obviously not so suited for evaporative cooling, as the figures for Brisbane, Bundaberg, Cairns and Rockhampton show. The Darling Downs is admirably suited, the wet-bulb temperatures at Dalby, Miles, Mitchell, Pittsworth, Toowoomba and Warwick being never on the average equal to 70 deg. F., even under summer conditions. Figures for the North and South Burnett areas are not available, with the exception of Gayndah, and the values given are not likely to be exceeded at the other dairying centres in these districts.

With milk at a temperature around 95 deg. F. in the vat, it is thus quite practicable to cool it by at least 20 deg. F. to 25 deg. F. if water is available at the existing wet-bulb temperature, even during the hottest month of the year. Quite a number of different methods have been tried with the object of cooling water to the lowest temperature possible, the most satisfactory being recirculation over a tower, when all relevant facts are carefully considered. This is not a new method and most farmers will be familiar with the technique, which is exemplified by the cooling of recirculated vacreator water at butter factories, and is often used for cooling engine jacket water at factories or local power houses.

Tower Experimental Work.

Experimental work has been carried on for some time in the Beaudesert district, this area being selected initially for several reasons. It is convenient to allow of regular tests being made, and is an area where milk production for the whole milk trade is increasing. Most important, however, is the fact that the area is in an intermediate position between the relatively humid coastal strip and the dryer atmosphere of the Darling Downs. Unfortunately, wet-bulb temperatures are not regularly recorded at Beaudesert, but values taken each month during the experimental work show that values similar to those at Ipswich and Gatton College could on the average be expected. During the hottest months occasional values up to 75 deg. F. have been recorded, but these are exceptional and the average values would be more like those indicated. Any tower which would give satisfaction in the Beaudesert area is thus likely to be at least as successful elsewhere, and the design submitted with this article is expected to be applicable in any area of the State. It must be mentioned, however, that further tests are considered advisable, especially in other representative dairying areas, and it is proposed to do this. All the indications are, however, that the design will prove satisfactory, and with this understanding the tower can be recommended to all dairy farmers with the object of cooling either cream or milk for the liquid milk trade or for cheese manufacture. The volume of cream to be cooled is relatively so small that the tower is ample for all requirements and no further work is necessary in this direction.

A very much larger tower could be suggested and it would, undoubtedly, result in efficient cooling. From the viewpoint of economy, ease of construction, and availability of materials, it is, however, neces-

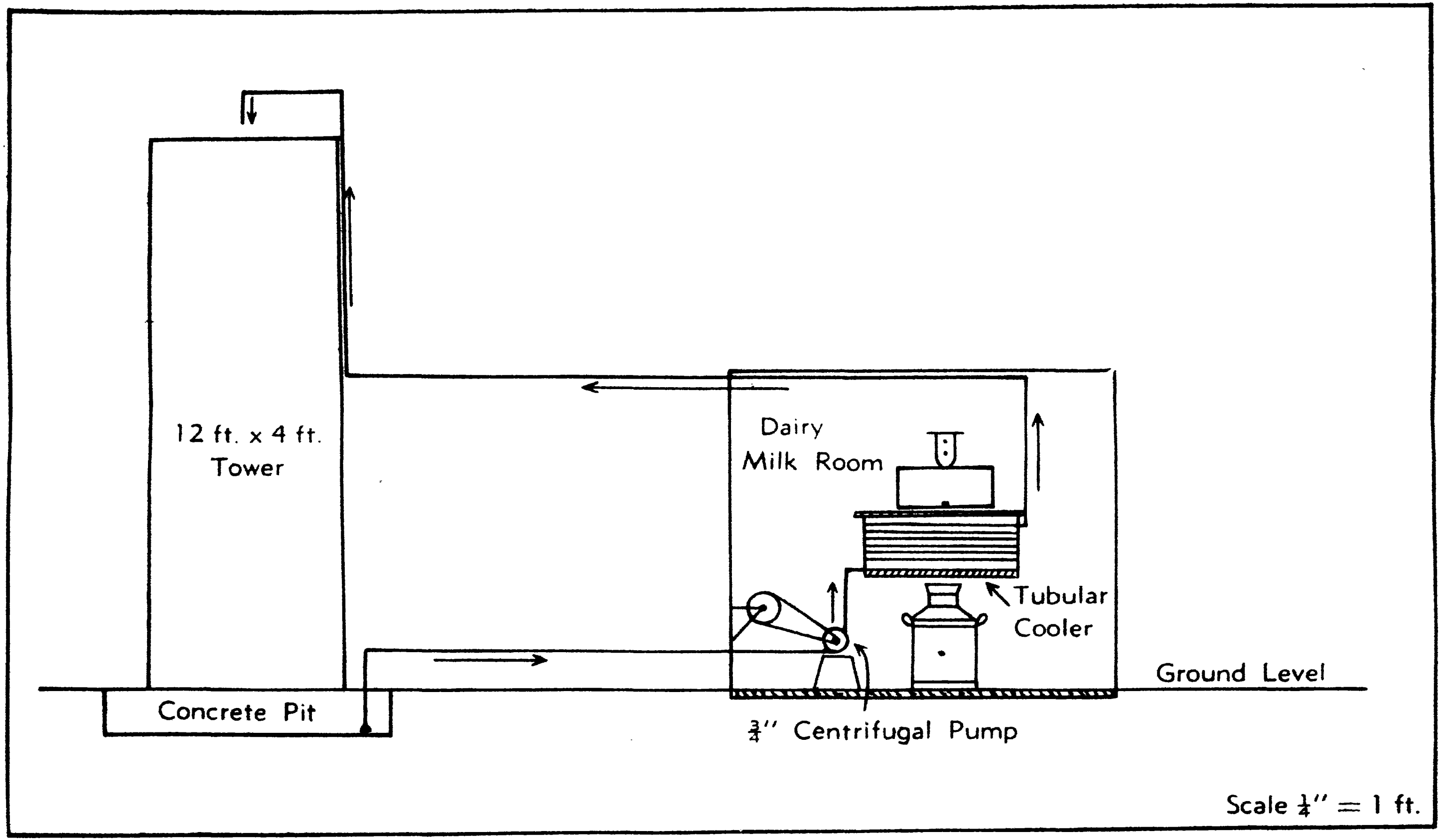


Plate 99.

SHOWING CIRCULATION SYSTEM USING A WATER-COOLING TOWER.

sary to use a tower no larger than actually required, the design submitted having an ample factor of safety to ensure satisfaction for all conditions conceivable after reviewing the experimental work so far carried out.

Description of Water Cooling System.

The accompanying diagram (Plate 99) shows the general arrangement of the tower-recirculated water cooling system. The water is drawn from the 1-ft. deep concrete pit below the tower by means of a ¾-in. centrifugal pump driven from the dairy house mainshaft as shown. The water is pumped through the tubular surface cooler and finally delivered for recooling at the top of the tower. A consideration of tubular water coolers was given in a previous article in this Journal, and they are the only type suitable for milk or cream cooling using tower-cooled recirculated water. The tower is placed away from the dairy building to ensure the proper ventilation essential for water-cooling. It should be located on the side of the building exposed to the prevailing winds during the summer months, but need not be far away provided free air access on its four sides is assured. The amount of water needed for recirculation is not large and the pit shown on the tower drawings will hold ample water (approximately 200 gallons). A deep pit is not advisable. Tests have shown that water leaving the tower is generally cooler than a large volume of water in a deep pit, and hence, on mixing, the water leaving for the cooler is higher in temperature than need be. Only sufficient water to properly cover the foot value is required. The other advantages of a shallow pit are ease of cleaning, safety where children are present, and a greater rate of circulation due to the much smaller suction lift unless (as is rarely the case) a deep pit is filled to the same water level. The cost of constructing a deep pit is also an item of importance, especially if made throughout of concrete, and results have shown that it is of no advantage from the viewpoint of efficient cooling.

Materials for Tower Construction.

All timber is of undressed hardwood and required concrete made of 4 : 2 : 1 mixture. The water distribution tray as shown is preferably of plain galvanised iron with 3-in. sides and perforated over its whole base area, although it can be made of boards (6 in. by ½ in.) closely butted together and with ½-in. holes bored along the centre of each board. The timber required is as follows:—

Tower Uprights: Four 3-in. by 3-in., 15 ft. long.

Louvres: Start 2 ft. from ground level and spaced 5 in. apart vertically; 25 are required for each side or 100 for the complete tower. They are of 6-in. by ½-in. hardwood and are 3 ft. 4¾ in. in length. Each louvre extends across the 3-in. face of the holding 3 in. by ⅝-in. batten strip resulting in a vertical overlap of ⅝ in. and 1½ in. measured along the louvre. Eight lengths of battening each 10 ft. long are required to hold the louvres.

Tower Bracing: Of 3-in by ⅝-in. battening. Eight pieces each 7 ft. long are required.

Baffles: Made of 6-in. by ½-in. hardwood. Five are required for each complete baffle, each board being 3 ft. 4 in. long. For the four sets of baffles twenty such boards are thus required.

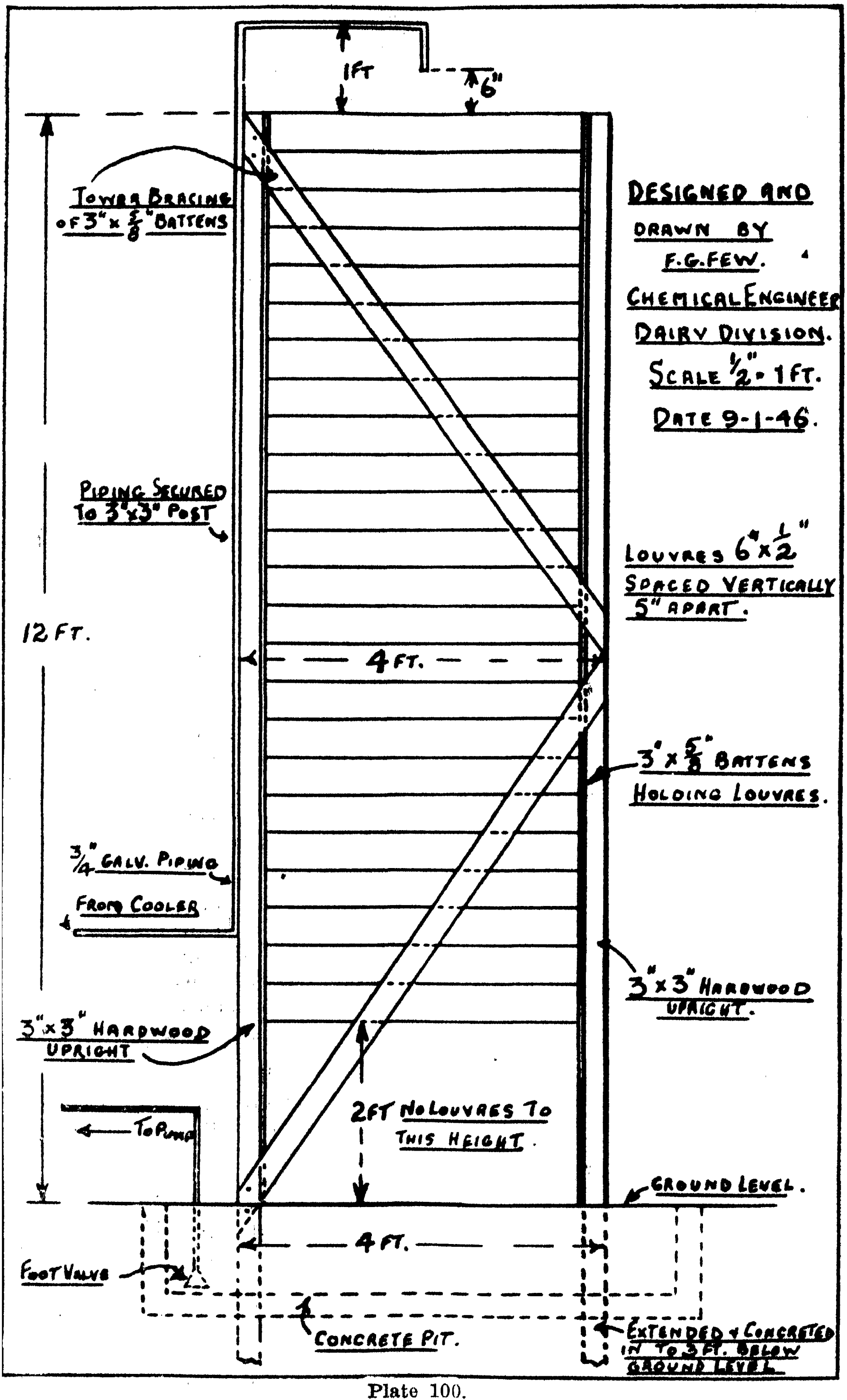

1FT
6"
TOWER BRACING OF 3" x 5/8" BATTENS
DESIGNED AND DRAWN BY F.G. FEW. CHEMICAL ENGINEER DAIRY DIVISION.
SCALE 1/2" = 1 FT.
DATE 9-1-46.
PIPING SECURED TO 3"x3" POST
12 FT.
4 FT.
LOUVRES 6" x 1/2" SPACED VERTICALLY 5" APART.
3" x 5/8" BATTENS HOLDING LOUVRES.
3/4" GALV. PIPING FROM COOLER
3" x 3" HARDWOOD UPRIGHT.
3" x 3" HARDWOOD UPRIGHT
TO PUMP
2FT NO LOUVRES TO THIS HEIGHT.
GROUND LEVEL.
4 FT.
FOOT VALVE
CONCRETE PIT.
EXTENDED & CONCRETED IN TO 3 FT. BELOW GROUND LEVEL.

Plate 100.

ELEVATION OF 4-FT. SQUARE WATER-COOLING TOWER.

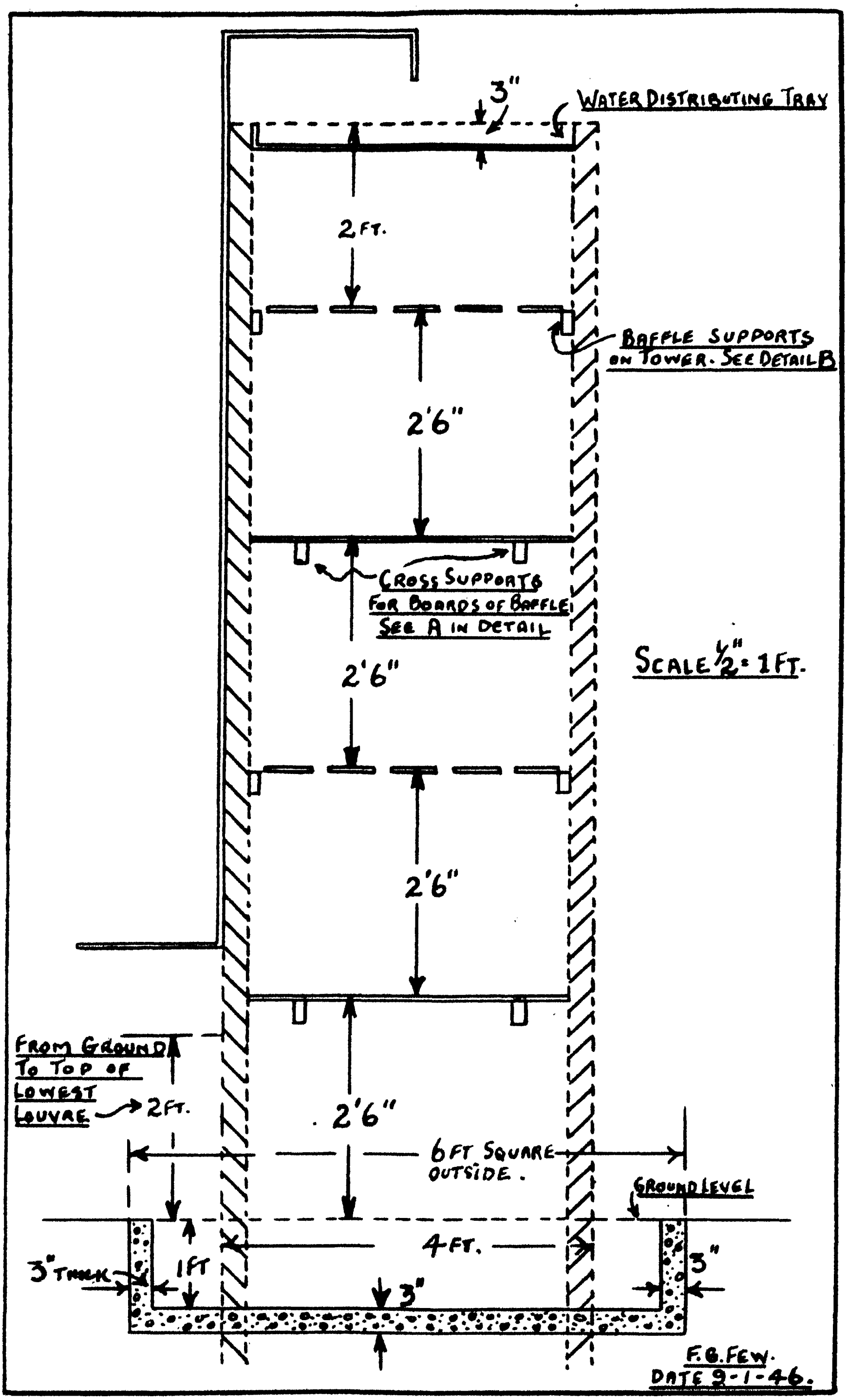


Plate 101.

SECTIONAL ELEVATION SHOWING NUMBER AND DISPOSITION OF BAFFLES AND CONCRETE PIT.

The baffle boards are nailed to cross supports, two of 3-in. by 1½-in. hardwood and 3 ft. 6 in. long being required for each complete baffle. Similarly these are flushed into the two 3-in. by 1½-in. supports, each 4 ft. long bolted to the tower uprights.

Summary of Materials Required.

Timber—

3-in. by 3-in. hardwood—four lengths of 15 ft. each.

6-in. by ½-in. hardwood—100 lengths of 3 ft. 4¾ in. each; 20 lengths of 3 ft. 4 in. each.

3-in. by 1½-in. hardwood—8 lengths of 3 ft. 6 in. each; 8 lengths of 4 ft. each.

3-in. by ⅝-in. hardwood—8 lengths of 10 ft. each; 8 lengths of 7 ft. each.

Concrete: Materials for approximately 20 cubic feet, allowing for concreting in of tower uprights. This requires about two-thirds of a yard of sand-gravel mixture and four bags of cement.

Piping: ¾-in. galvanised of a length determined by position of tower relative to dairy building. Clips to hold piping to tower also required.

Bolts and Nails: 16 bolts each ⅜ in. by 6 in. long. Nails—supply of 2 in.

Water Distributing Tray: Plain galvanised iron sheet 3 ft. 6 in. square with 3-in. sides soldered.

Circulating Pump: ¾-in. centrifugal pump, belt-driven from shaft in dairy.

Cooler: Standard tubular cooler either for milk or cream, as the case may be.

Construction of Tower.

The four tower uprights are erected on the chosen site after first excavating the necessary pit below the ground level. The posts are concreted in the ground up to the level of the bottom concrete of the pit—i.e., up to 1 ft. 3 in. from the ground level. The baffles and distributing tray are assembled and placed in position as shown on the drawings. Sections of battening from the 10-ft. lengths are cut to fit between the supports (B) bolted to the uprights and the appropriate number of louvres are fixed to the battens by nailing through from the outside of the battens into the louvres themselves. The assembled sections are then nailed to the tower uprights, the nails passing through the battens in the reverse direction to those holding the louvres. The tower bracing is then finally secured, and the piping, &c., arranged as required. Construction of the concrete pit is carried out, and any light iron or steel reinforcements available can be advantageously added when laying down. Similarly, a concrete path strip 2 ft. wide all round the tower prevents mud, &c., from easily entering the pit during wet weather or following excessive drift loss from the tower due to high winds. The path should slope away from the tower across its width to prevent water entering the pit during wet weather.

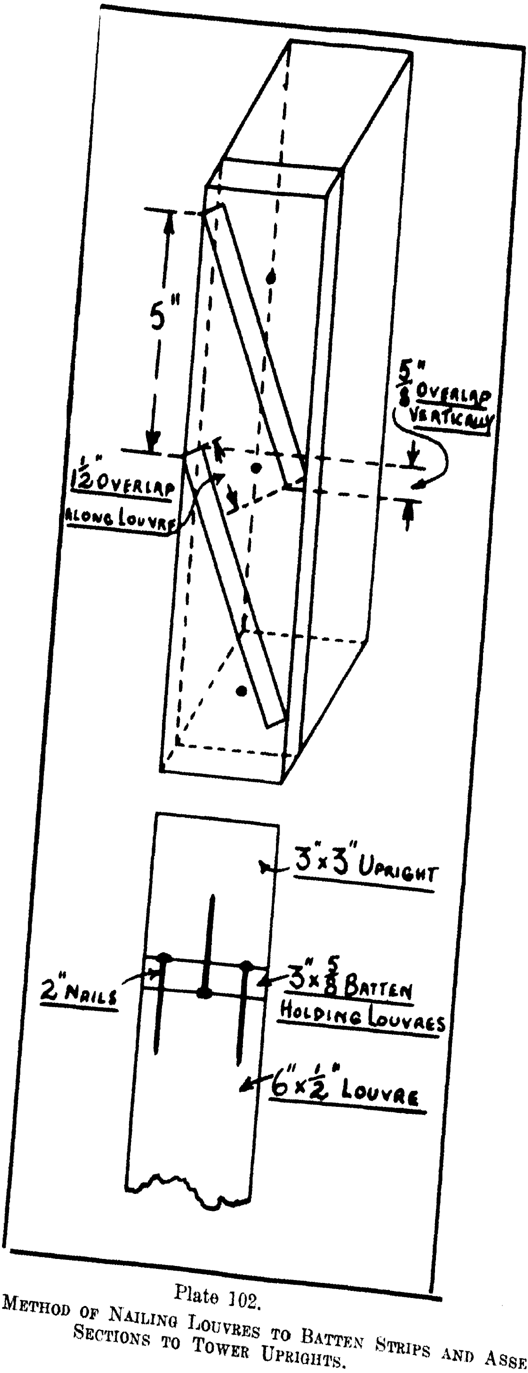
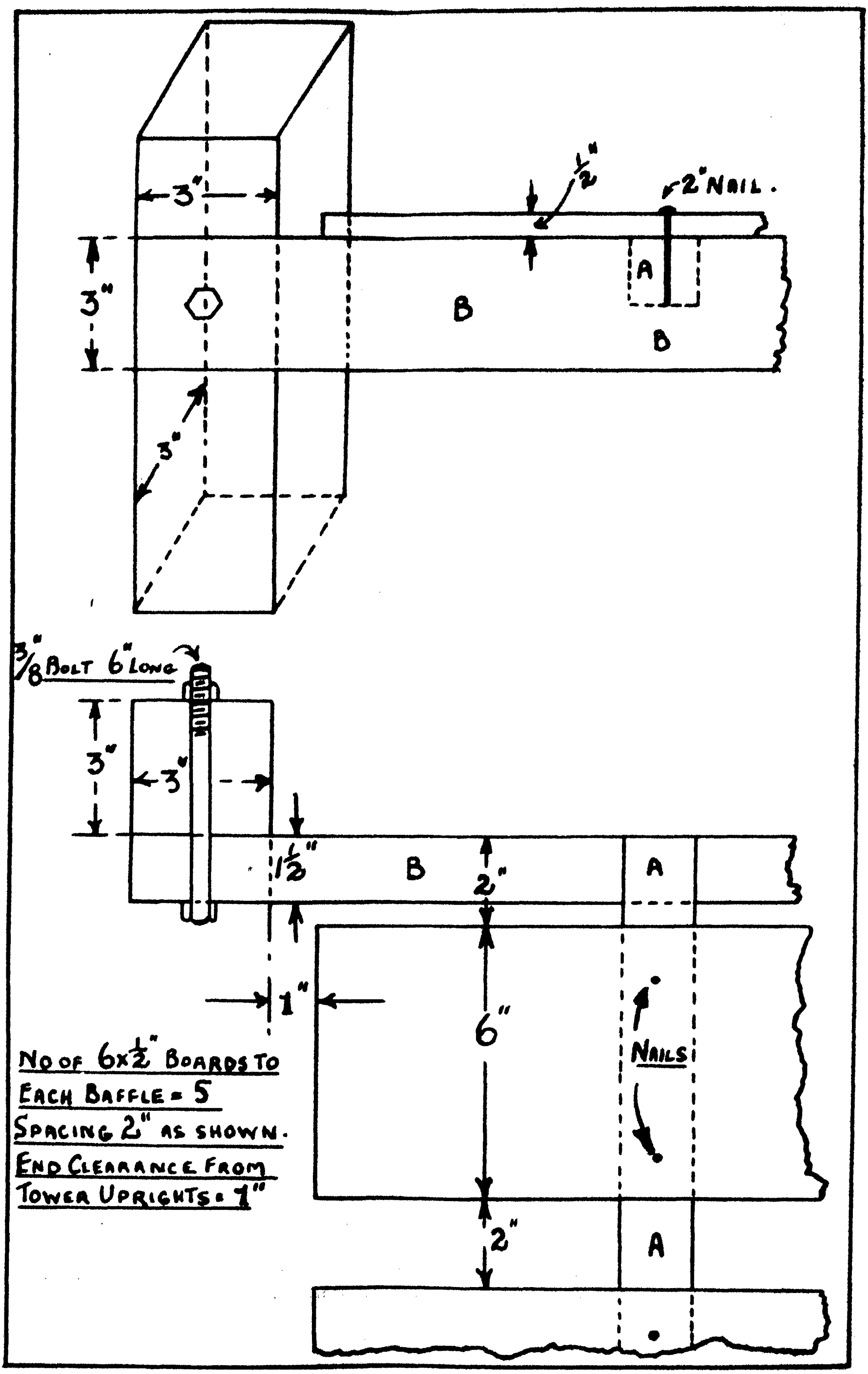


Plate 102.

DETAIL SHOWING METHOD OF NAILING LOUVRES TO BATTEN STRIPS AND ASSEMBLED SECTIONS TO TOWER UPRIGHTS.



NO OF 6×½" BOARDS TO EACH BAFFLE = 5
SPACING 2" AS SHOWN.
END CLEARANCE FROM TOWER UPRIGHTS = 1"

Plate 103.

SHOWING BAFFLE BOARDS NAILED TO CROSS SUPPORTS A AND SUPPORTS B FOR COMPLETED BAFFLES BOLTED TO TOWER UPRIGHTS.

Scale: 3" = 1 ft. F. G. FEW, 9-1-46.

Costs.

It is not possible to give exact costs due to the many variable and local factors involved. The cooler suitable for milk cooling (24 in. by 13 in.) costs about £8 10s., and a suitable pump and pulley about £6 complete. The timber, cement, &c., in a particular case cost around £5 10s., and approximately four days were required for the construction. The cost to the farmer doing the work himself is thus around £20, including cooler, pump, and driving pulley. In the case of most milk suppliers the pump and cooler are already on hand, and thus the additional cost, excluding labour, is merely that for the tower requirements. While a smaller pump would suffice for cooling cream, it is not considered that the cost of the pump is excessive, and it is likely to be of use in other ways, such as pumping water for tanks, household supplies, &c.

The practical cooling of cream or milk to an extent not possible otherwise is thus within easy reach of the farmer in most dairying districts throughout the State.

REFERENCES.

(1) Charcoal coolers on Dairy Farms—*Queensland Agricultural Journal*, Vol. 60, Part 5, May, 1945, p. 302-10.

(2) Milk Cooling on Darling Downs Farms—*Queensland Agricultural Journal*, Vol. 61, Part 4, October, 1945, p. 237-45.

Plate 104.
IN THE COOLABUNIA DISTRICT, SOUTH BURNETT.

Some Points in Herd Management.

C. R. TUMMON, Division of Dairying.

THE management of a dairy herd has an important bearing on milk production, and for this reason alone, greater attention could be given to this phase of dairying. Herd management commences from the time the calf is born.

Care of the Calf.

It may be assumed that only the best calves are kept—those from cows of proven production through herd testing, and sired by a well-bred bull. Once these calves have been selected, constant attention is required for the next six months or so of their lives until they are weaned, if they are to develop to the required standard. All setbacks in a calf's life should be avoided. Scours in calves probably produces the greatest setback. This is usually due to faulty feeding methods, and is often avoided by feeding a high proportion of fresh milk for the first few weeks, gradually reducing this milk and substituting skim milk. It is essential that the colostrum milk be fed for the first few days of the calf's life. Calf feeding buckets should be kept well cleaned and sterilised. In many districts calves suffer from worm infestation—principally stomach worms, but sometimes lung worms as well. Where any evidence of worm infestation is noticed (rough hair, pot belly, or bottle neck), regular drenching should be adopted and other precautions taken, such as changing calf paddocks, or liming paddocks to prevent re-infestation. During this period of calf feeding the calf should be handled as often as possible, and taught to hand-feed. There will then be little difficulty in breaking in the calf to the bails later on.

After weaning, calves should be kept in a suitable paddock with good feed and water and the necessary licks, and kept away from the bull until well grown, usually about eighteen months of age. Regular inspections should be made of these heifers, and when necessary, treatment for ticks, buffalo flies, &c., administered. A few days before these heifers are due to calve, they should be put in a paddock handy to the farmer's house, so that they may be observed, and any assistance can readily be given if difficult calving is experienced.

The heifers should be treated kindly when "breaking in" to bails. The calf should be taken away from her immediately she is brought into the yard. This is important, as the young cow will cease to fret about her calf, and will settle down more quickly. After calving, all cows should be douched in order to keep them clean.

Care of the Bull.

The bull must be kept in a separate "bull paddock." This practice is recommended in every way. It enables the farmer to regulate his calvings, according to the seasonal conditions, and it also conserves the bull's services. The bull is also less likely to get away and serve strange cows, possibly picking up infection.

All precautions should be taken to safeguard a herd against disease. An isolation paddock should be provided, and any animals noticed to be sick should be immediately segregated from the herd and placed there. Care should also be taken when introducing fresh cows from outside sources to see that they are healthy in every way.

Herd Testing.

Herd testing should be continuous. Even though the cows may all come from a good producing strain, it does not always follow that the progeny will be equally good.

Treatment of Cows at Milking.

Cows should be brought in to the milking yard with as little running about as possible. Dogging and the use of whips should be avoided. It has been found that these practices are responsible frequently for "holding up" of milk by cows. Cows are creatures of habit, and therefore it is a wise practice to accustom them to a routine. Milking should be done at the same time each day, and cows should always be milked in the same order. The udders should be washed immediately before milking. All these factors have a very important bearing on immediate "let-down" of milk. The milking should be done as quickly as possible, in order to secure the maximum amount of milk available in the udder. If milking machines are in use, care should be exercised to see that the teat cups do not stay on too long. If this happens, the teat cups gradually creep further up the teat, and some slight damage may be done to the delicate tissues of the udder, and this may possibly be a predisposing cause of mastitis. Non-stripping of dairy cows is recommended. This practice saves time, and it has now definitely been established that no harm is done to the cow, and the same amount of milk is obtained over a period, while there is no tendency for the cow to dry off. Where machines are used, the teat cups should be pulled down slightly when the cow has just milked out, and at the same time the udder should be gently grasped by the milker's hand, and rubbed down. This milks the cow out quite sufficiently.

When drying cows off, the old custom of gradually drying them off should be abandoned, and they should be turned out immediately, with no further milking taking place. This additional milking only serves to stimulate milk production.

It is suggested, therefore, that farmers should give every attention to this subject of herd management, and maximum production may be confidently expected where the foregoing suggestions are put into practice.

QUEENSLAND SHOW DATES.

Queensland Agricultural Show Societies are quickly moving again into active organization, and appended is a list of show dates, registered up to 10th January by the Queensland Chamber of Agricultural Societies, for 1946:—

May.

Gympie	22nd and 23rd
Biloela	23rd and 24th
Laidley	24th and 25th
Blackbutt	24th and 25th

June.

Kalbar	1st
Boonah	7th and 8th
Childers	10th and 11th
Lowood	14th, 15th, and 17th
Gin Gin	17th and 18th
Rockhampton	19th to 22nd
Mackay	24th to 27th
Toogoolawah	28th and 29th

July.

Proserpine	5th and 6th
Rosewood	12th and 13th
Gatton	19th and 20th
Cairns	23rd, 24th, and 25th
Yarraman	26th and 27th
Ipswich	30th and 31st, and 1st and 2nd August

August.

Lawnton	2nd and 3rd
R.N.A.	12th to 17th

September.

Canungra	7th
Beenleigh	20th and 21st

October.

Nerang	4th and 5th

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock, which qualified for entry into the Advanced Register of the Herd Books of the A.I.S. and Jersey Societies. Production records for which have been compiled during the month of March, 1946 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
MATURE COW (STANDARD 350 LB.).				
Rhodesview Kitty 16th	W. Gierke and Sons, Helidon	10,651·9	452·161	Fairvale Major
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Rhodesview Fanny 49th	W. Gierke and Sons, Helidon	7,789·1	348·737	Fairvale Major
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Glen Idol Florrie 7th	Estate P. Doherty, Gympie	8,928·85	364·976	Blacklands Count
JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Wandegong Rosebud 2nd	H. G. Watson, Killarney	7,851·95	328·252	Alfa Vale Verdence
Glen Idol Daphne 11th	Estate P. Doherty, Gympie	7,770·6	314·624	Blacklands Count
Valera Sheila 11th	F. B. Sullivan, Pittsworth	8,451·55	295·758	Valera Daphne's Prince
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Sunnyview Polly 2nd	J. Phillips, Wondai	10,740·15	473·725	Sunnyview Kitchner
Ardilea Broady 10th	W. Hinrichsen, Clifton	8,818·75	354·523	Newstead Reliance
Valera Pearlie 2nd (233 days)	F. B. Sullivan, Pittsworth	7,247·5	283·463	Alfa Vale Pride 2nd
JUNIOR, 2 YEARS (STANDRAD 230 LB.).				
Valera Roseleaf 14th	F. B. Sullivan, Pittsworth	9,065·3	374·407	Alfa Vale Pride 2nd
Valera Lila 13th	F. B. Sullivan, Pittsworth	9,001·98	354·555	Alfa Vale Pride 2nd
Ardilea Broady 11th	W. Hinrichsen, Clifton	7,220·5	346·176	Newstead Reliance

JERSEY.

MATURE COW (STANDARD 350 LB.)

Kathleigh Mona	F. W. Kath, Dalby	10,415·75	536·726	**Banyule Senor**
Kathleigh Patience	F. W. Kath, Dalby	9,166·74	475·015	**Retfords Kings Flier**
Kathleigh Wattle	F. W. Kath, Dalby	8,261·06	471·634	**Retfords Kings Thorn**

SENIOR, 3 YEARS (STANDARD 390 LB.).

Boree Charming Girl	W. and C. Tudor, Branch Creek	7,194·95	368·202	Maurfield Larkspurs Gift
Glenview Mirth	W. Muller, Marburg	6,594·57	355·827	Trinity Governors Hope
Lermont Fan	J. Schull, Oakey	7,454·4	300·235	Lermont Ambassador

SENIOR, 2 YEARS (STANDARD 250 LB.).

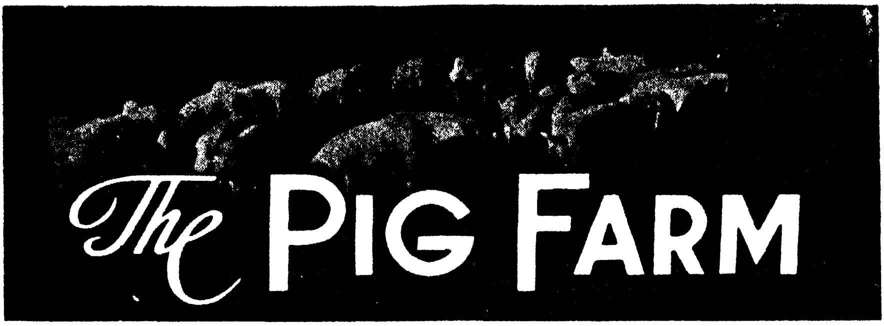
Kathleigh Biddy	F. W. Kath, Dalby	7.059·68	395·632	Oxford Daffodils Victor
Tecoma Golden Darling	A. Semgreen, Coolabunia	5.985·25	356·163	Trinity Golden Royal
Navua Dreaming Victorine	F. Eager, Petrie	6,406·25	274·435	Navua Victorius Ruler

JUNIOR, 2 YEARS (STANDARD 230 LB.).

Kathleigh Maytime	F. W. Kath, Dalby	6,827·82	391·110	Oxford Daffodil Victor
Peeramon Glades	N. Harris, Ravenshoe	5,347·45	281·705	Peeramon Some Hope
Tecoma Golden Pet 2nd	A. Semgreen, Coolabunia	5.423·15	278·824	Trinity Golden Royal
Lermont Golden Pearl 2nd	G. Tilley, Beaudesert	5.398·55	257·085	Selseys Samares Hallmark
Romsey Rosina	J. Wilton, Killarney	4,512·0	241·580	Oxford Pixies Victor

Plate 105.

THE CONDAMINE AT LYNDHURST.



The Marketing of Pigs.

F. BOSTOCK, Officer in Charge, Pig Branch.

TYPE, condition and method of preparing pigs for sale should have the close attention of every farmer, because much money can be lost through carelessness in marketing.

Farmers who top the market gain a lot of satisfaction from the knowledge that their pigs are of the required type and have been marketed in the right way. While it may be impossible for all to obtain top price, that should certainly be every farmer's aim, but in any case satisfaction will be found in the consciousness of a job well done and in fair value received.

Good pigs marketed in the right way invariably attract good prices. On the other hand, poor-type animals, or those marketed in a dirty condition or showing other evidences of careless handling only sell well when supplies are below requirements.

Points in profitable pig marketing to be considered are:—

1. Pigs should be of right type to suit the market.
2. Proper feeding to ensure quick, healthy growth.
3. Plenty of "bloom" and clean skin, indicating proper housing.
4. Correct weight and condition.
5. Care in handling.
6. Careful branding in the proper place (just off the centre line of the body and on the shoulder with a right-sized brand).
7. Proper transportation so that the pigs are delivered in the sale pen clean and free from bruises.
8. Loading races should be free from faults in construction (the use of sticks, whips or the boot when loading should not be tolerated).

A pig of correct type is one which will measure up to market requirements and not necessarily of any particular breed. Good and bad type pigs may be in every breed. Therefore, farmers should give careful consideration to type when selecting breeding stock and not be satisfied with any class of animal. Good type baconers may be obtained from certain pure breeds, or by using two pure-bred animals of different breeds; or may be again improved by using sows of the first cross, mated back to a pure-bred boar.

The pig most in demand by the bacon trade and one which will realise the highest price per lb. is the long bodied, evenly proportioned animal with no excessive heaviness of head and shoulders, well filled hams, fine bone and reasonable depth of body to make a carcass of even and well-balanced conformation.

Unfortunately, the over-fat pig is still in evidence in our markets, and if farmers would pay more attention to the feeding of these pigs and control the amount of food according to the condition of the animal, together with providing ample grazing areas, they would receive more profitable returns. Apart from the financial loss, the loss through extra food consumed and wasted is considerable.

Pigs travel better on an empty stomach than on a full one and should not be fed just before despatch; if food is given, it should only be a small quantity of something solid, such as grain. Swill or bulky foods should never be given pigs just before sending them to market.

◆

AN AUSTRALIAN FARMER WRITES A BOOK.

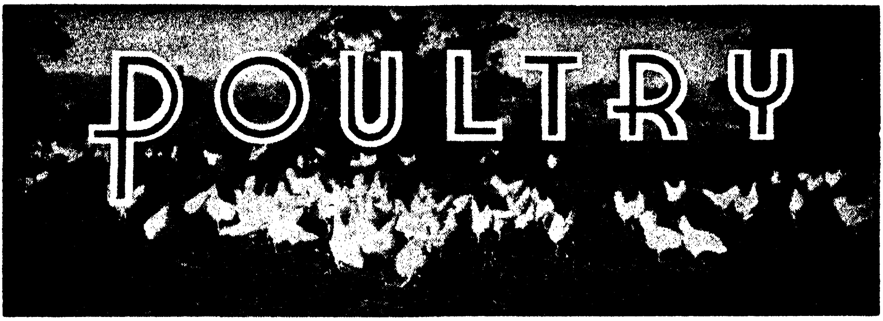
Not all are gifted with the power of literary expression, but here is a case of an Australian farmer who has made a great success of his farm, who loves his work and has found time to write a book about it. *Now Blame the Farmer* is the title, and the author is Hugh S. Robertson, who, incidentally, is an old A.I.F. Digger. His work has most of the qualities of a great book in full measure. His introduction contains the germ of his idea. He writes: ''The primary purpose of this book is not to exonerate the farmer; it is an attempt to explain away the comparative failure of the general scheme of land utilisation. It is intended to expose the excesses and abuses that have led to the wanton destruction of the chemical and physical properties of the soil, and the tragic depopulation of the country.''

In developing his idea, he pulls no punches and carries it through with a remarkable grasp of Australia's social history—the beginning of land settlement, pastoral development, the discovery of gold and the new land hunger which followed, the carrying over of the mentality of the miner, ruled by the hole-in-the-ground idea, without thought of the fact that the essence of good farming is intelligent cultivation of the soil and the maintenance of its fertility, as opposed to exploitation by a system of ''mining'' the soil instead of farming it—all these, including the entry of the financier into the field, are briefly yet fully and powerfully handled.

Much more could be said of this good Australian farmer's book, but space will only permit the summarising of a few essentials set out by its author. Here they are—

The adoption of an agriculture designed to restore and maintain fertility, and to confine farming to the strict limits of sound principles and sane practices. Men and women must come first. Whenever land settlement has been successful, it has succeeded because the terms and conditions of the settlement have given to men and women the opportunity of a good and useful life; wherever land settlement has failed, the failure has been due, not always to the quality of the land but more often to the quality of the life on the land. Farmers—Australian farmers, anyhow—must not be just peasants.

Another essential is the provision of adequate machinery for the change-over from bad land usage to good land usage, and to a high conception of country life. Still another essential is a complete system of stabilised price levels so that we may become commercially civilised in our approach to the primary industries. *Now Blame the Farmer* should be a welcome addition to any farmer's bookshelf.



The General Farm Poultry Flock.

A. W. McLAUCHLAN, Poultry Inspector.

UP to 100 head of poultry are kept by most farmers. The fowls are usually kept to supply domestic egg requirements, the surplus being sold through local channels, and also poultry for the table. The standard and quality of ordinary farm fowls are generally much below commercial poultry farm standards. All varieties of breeds are housed in all types of buildings. Of course, it is realised that one engaged in diversified production has not the time to give specialised attention to poultry as compared with the commercial poultry farmer.

In these days, hatching eggs, chickens, and stock are easily procurable, so there is no real reason why unprofitable birds should be kept. A good flock will thrive just as well as nondescript farm fowls.

A farm poultry flock may be founded on—

1. Fully grown fowls.
2. Started pullets 6 to 8 weeks old.
3. Day-old chickens.
4. Day-old pullet chickens.

Of these four foundations, the second should appeal to the general farmer, for at this age the chief worries of flock establishment are over. In buying such chickens, it is advisable to select them from registered hatcheries, so as to obtain disease-free stock as far as is possible.

Housing.

Proper housing for the stock should be provided. Failure to make a success of poultry farming is mainly due to lack of adequate accommodation. The buildings should be constructed in a workman-like way. Ample room and proper ventilation without draughts should be provided. There are three main systems of housing, viz.:—

1. Intensive, where birds are permanently housed.
2. Free range, where house is provided for sleeping under cover.
3. House and yard, where house is provided for sleeping and a netted run is attached.

The intensive system of housing has proved its economical value in the commercial poultry farming districts, as it ensures the greatest protection from the weather. The farmer can easily observe the health of his flock and check the spread of any disease which may occur.

Under the free range system which is most common in mixed farming areas, the birds are exposed to the weather, but the food bill is not so great as compared with fowls housed under the intensive system. The free range flock scratches for its own living to a large extent.

In the house and run system there is often the serious difficulty of soil contamination. However, this form of housing is sometimes seen in mixed farming areas, but usually the fowls are allowed free range during the afternoon. The site selected for the house should be on level, well-drained ground. The house should face north or north-east, and in all cases the floor should be cemented so as to control disease.

Culling.

Although housing conditions generally and feeding have much to do with profitable production, neither is so important as culling as a means of increasing and maintaining productivity. Hens should be culled after their second year of production, together with unfit birds. Presuming the conditions regarding food and housing are as they should be, even then the proportion of the birds in the flock which should be culled will be so high that it will be possible to appreciatively cut costs without interfering with the egg supply by simply grading them out.

Disease.

Prevention and control of disease is a problem facing every farmer. Disease in every case lowers the efficiency of production. Bad management, feeding, housing predisposes the flock to attack.

On mixed farms where a few birds are suffering from disease it is far more economical to kill and burn them than to apply treatment.

Sanitation is one of the chief controls of disease. Pens should be thoroughly cleaned regularly, drinking vessels should be kept clean and water changed regularly. New stock taken on to a farm should always be isolated for a time to avoid or reduce disease risks, and crates in which they were conveyed should be burnt, as parasites—such as the poultry tick or stickfast flea—may easily be introduced.

The most important poultry parasites are lice, mites, ticks, worms and, in some areas, the stickfast flea. By their increasing numbers and irritating effects these pests cause considerable discomfort to their hosts, with the result that the laying hens lose condition and egg production is reduced accordingly.

The poultry tick conceals itself in cracks and crevices of the house and perches during the day and attacks the birds at night. They may be found in all stages from the small six-legged larvae up to the adult tick with eight legs.

A knife or chisel thrust into the crevices of an infested shed will come out smeared with blood if ticks are present. Heavy losses have been recorded on poultry farms from fowl tick fever, which is caused by the tick being a carrier of the organism.

Ticks can be easily introduced on to a farm in infested crates and chicken boxes and by borrowing broody hens. The tick is very difficult to control, as its habit of hiding in cracks protects it from efficient spraying. Trees, pig pens, and similar places adjacent to fowlhouses have often been found to be infested. When badly infested, total destruction of the house is recommended. Creosote or kerosene emulsion make satisfactory sprays under pressure strong enough to force the spray into cracks, but this should be a regular practice. Perches should be painted also with crude oil.

Kerosene emulsion is made by boiling 1 lb. of soap in 1 gallon of rain water until dissolved. Remove the mixture from the fire and add 1 gallon of kerosene. Another 8 gallons (two kerosene tins full) of rain water is added before use.

Sawn timber used in the building of a fowlhouse is more easily treated for ticks than bush timber. The less timber used in the construction of the walls of the house the better, so as to minimise harbourage for ticks.

From the foregoing it may be gathered that profitable fowl keeping on a mixed farm requires much more than feeding a little grain and gathering in a few eggs; it requires well-bred stock properly housed and managed.

◆

NO SYNTHETIC EQUAL TO NATURAL WOOL.

During the war, the Germans produced huge quantities of synthetic textiles from all sorts of material. They produced among other things artificial wool and artificial cotton. They also produced a so-called "spinning paper" as a substitute for hemp, jute, sisal, and other base fibres. Yet, after all, a leading German scientist has admitted that as yet there is no synthetic equal to natural wool or cotton, there is still no efficient substitute for wool despite all the claims made for synthetics in recent years.

Coming from such a source, this is a remarkable admission of especial interest to Australian woolgrowers. It is a statement contrary to Germany's pre-war claims that the production of synthetic fibres made her self-sufficient in respect of textile requirements. It is interesting now to know that those claims were not confirmed. In 1938, Germany imported more than a million bales of wool, and made strenuous efforts to obtain supplies during the war.

Since the war ended, buyers in most countries have shown by their keenness to obtain natural wool the anxiety of the peoples of those countries to obtain clothing made from the sheep's overcoat. Other woollen goods also are greatly needed by them, because on their wartime experience they cannot be beaten for comfort and long wear.

It is another interesting reflection that with all the much publicized qualities of synthetic materials, the chief use so far found for them is in stockings and a proportion of the women's dress goods trade. For those articles of clothing, synthetics have displaced silk, and, to an appreciable extent, cotton. The main appeal of these synthetics—nylon and the rest—is their appearance, sheen, and quick drying property after washing.

Although research workers are busy producing more of these attractive textiles, other research workers are busy with wool, and there seems no reason why they shouldn't succeed in producing stockings made from wool which will have all the attractiveness of the synthetic product and give greater foot comfort to the women who wear them. So there is still strength in the softgoods seller's slogan—"All wool and a yard wide." The "yard wide" in that slogan has, of course, no dimensional significance in regard to women's stockings!

Wool—natural wool off the sheep's back—can still hold the lead in textile manufacture, beating all competitors. All the same, we cannot afford to ignore the menace of competing fibres or let up in the drive for quality in pastures, flocks, and fleeces, for wool production is still the greatest of our land industries, and is still the highest factor in our national economy.

Plate 106.

CUTTING LUCERNE, KINGAROY DISTRICT.

Plate 107.

A SOUTH BURNETT FARM, CRAWFORD, MT. WOOROOLIN DISTRICT, NEAR KINGAROY.

ANIMAL HEALTH

Nodule Worm Disease of Sheep.

F. H. S. ROBERTS, Division of Animal Industry.

NODULE worm disease, or oesophagostomiasis, is a serious disease of sheep in many countries throughout the world. In Australia it is of most importance in those areas which receive the bulk of their rainfall in the summer months. The sheep raising areas of Queensland are all summer rainfall areas and the nodule worm has a distribution which extends well into our western country. However, it becomes serious only in those areas in receipt of an annual rainfall of about 20 inches and more. The Emerald-Clermont district and the Darling Downs know the depredations of this parasite only too well.

Description.

This parasite inhabits the large intestine of sheep, where it is found in greatest numbers in the region of the crown. It is a stout whitish worm, growing up to about ¾ of an inch in length, with the head bent somewhat like a hook. On opening up the bowel, the worms will be found lying adjacent to the bowel wall.

Life History.

Eggs laid by the female worm reach the ground in the pellets. Under summer conditions of warmth and moisture, a larval worm quickly develops inside the egg and within 24 hours the egg has hatched and the larva is set free. The larvae are now free-living in the soil and vegetation and gradually grow into a stage—the infective stage—when they are ready to infect the sheep. In warm moist weather this infective stage is reach in 6-7 days.

Where the grass is wet with dew or rain the larvae ascend the blades and are swallowed by the grazing sheep. They pass into the intestine and then bore into the intestinal wall, particularly that of the large bowel. The time spent in the intestinal wall varies considerably. In young sheep it is usually five to eight days, but may extend to three months, whilst in older sheep this period is usually longer, even up to six months. The young worms eventually make their way back into the bowel and here they stay for the remainder of their life. Eggs are laid two to three months after the larvae have been swallowed.

Nodule Worm Disease.

When the larva penetrates the wall of the bowel, the tissues react to the invasion and a nodule is formed around the larva. The nodule encloses a greenish cheesy material, in which the larva lies. As the nodule becomes older the contents harden and eventually become calcarous. In grown sheep which have been exposed to infection for some time the nodules are conspicuous and may be found throughout the entire length of the small and large bowel, being more numerous in the latter. Such sheep, it is to be noted, are not usually infested with many adult worms. In young sheep, on the other hand, the nodules are usually small and insignificant and adult worms are present in large numbers. These nodules seriously interfere with normal bowel movement. This is one reason why sheep which have been exposed to heavy infection for most of their life fail to fatten. There are, however, more serious effects of infestation to be seen, principally in young sheep. The young worms, when breaking out of the nodules, produce ulcers and inflammation of the bowel wall. This condition is accompanied by a severe diarrhœa, with the passage of much mucous. Furthermore, the adult worms in the bowel are considered to excrete certain harmful substances which, on absorption by the sheep, cause serious ill effects.

Nodule worm disease is most harmful among breeding ewes and young sheep. Sheep pick up the larvae during the spring, summer and early autumn, but symptoms are not seen, as a rule, until the late autumn and winter, by which time the larvae have left the nodules and are lying in the bowel as adults. The poor state of the winter pastures is also a factor in outbreaks during this period of the year. A massive infestation may be rapidly fatal. The chronic type of the disease, however, is more common. Animals lose condition, and are affected with a diarrhœa containing much mucous, and sometimes blood. If such sheep are driven they run with a stiff awkward gait and show a characteristic tucked-up attitude. The skin and mucous membranes of the mouth and eyes may be pale, sometimes a doughy white. A marked break in the wool is not uncommon. Young sheep that survive remain stunted and unthrifty.

When making an examination of an animal suspected of suffering from nodule worm disease, one should give first consideration to the number of worms present. In young sheep 100 or more worms are regarded as being definitely harmful. When such infestations occur, the bowel wall in the vicinity of the worms will be found to be inflamed, thickened, and thrown into folds and covered with a thick, purulent, blood-streaked mucous, in which the worms lie. As indicated previously, the number of nodules to be seen is simply indicative of the period of exposure to infection and, in young sheep, they may not be at all conspicuous.

Treatment and Control.

Phenothiazine.

There is no drench of any value against the nodular form of the parasite. On the other hand, phenothiazine is highly efficient against those worms lying in the bowel. Phenothiazine is a greenish powder which is insoluble in water, but preparations are available whereby the phenothiazine can be suspended in water and thus be delivered to the sheep as a drench.

When preparing phenothiazine for drenching, it will be found a great advantage if the powder is first sieved to eliminate all lumps. A kitchen flour sifter is suitable for this purpose. There are various brands of phenothiazine on the market, and the directions for mixing given by each proprietor should be carefully followed. The final product should be a smooth, creamy mixture which can be delivered fairly readily in the drenching syringe specially manufactured for phenothiazine. These syringes may tend to clog after some use, but this can be prevented by frequent washing in water and occasional oiling with liquid paraffin. After use, the springe should be thoroughly washed and oiled.

The dose rates are as follows:—

Grown sheep, 20 grammes;
Sheep 8—12 months, 15 grammes;
Sheep 4—8 months, 10 grammes.

Phenothiazine, being a dye, will unfortunately stain wool with which it comes into contact. This stain will not scour out. Part of the phenothiazine is rapidly absorbed by the sheep and is excreted in the urine, which is stained a reddish brown within an hour or two after drenching and may maintain its colour for four to five days. Urine containing phenothiazine will also stain wool. This staining can be prevented to a large extent if the following advice is considered:—

(*a*) After filling the syringe, dripping can be reduced by washing the nozzle in water. Water used for this purpose should be placed in a handy container and should be changed frequently. Another method is to attach, by means of rivets, a piece of thick sole rubber or leather (4 in. x 3 in. x 2 in. high) to the edge of the vessel containing the phenothiazine. Two or three V's are cut in this material and the nozzle of the syringe is drawn through one of these slots to remove any adhering suspension.

(*b*) A piece of cloth or sacking should be kept handy for wiping the hands.

(*c*) Sheep being drenched retain some of the phenothiazine on their mouths. This wiped against other sheep will stain. Provision should therefore be made that, as each sheep is drenched, it is immediately released from the race. The yard into which the drenched sheep are run should be large enough to prevent crowding. Finally, drenched sheep should be returned to their paddock as soon as possible to lessen contact with the phenothiazine passed in the urine.

Sheep are very tolerant to phenothiazine, much more so than other domestic animals. Reports, however, have been made that, when applied in late pregnancy, phenothiazine may cause abortion. For this reason it is advisable not to use this drug within a month of lambing.

When to Use Phenothiazine.—When the life history of the nodule worm is considered, it is found that adult worms do not appear in any numbers in the large bowel until during the autumn. Furthermore, during the winter the low temperatures and dry conditions are very unfavourable to eggs and larvae in the pastures, and during this period the number of larvae that gain access to the sheep is reduced to a minimum. In heavily infested areas, sheep, particularly the young sheep, should then be given their first treatment about April. As phenothiazine is also very effective against hair worms and the barber's pole worm, this treatment gives the sheep a better chance of thriving during the winter.

There will be, however, a number of larvae still within the nodules at the time of this treatment, and to catch these when they have moved into the bowel a second treatment will be required in June. A third treatment is given in August. Treatment at this time is particularly advantageous in the case of breeding ewes, for by removing their worms they will not contaminate the pastures for their lambs.

Finally, it must not be forgotten that spelling pastures for one month or more results in a considerable destruction among worm eggs and larvae. Whenever sheep are treated at any other time than mid-winter they should be placed in such a spelled paddock, which could be used by horses whilst being spelled from sheep. This applies particularly to weaners.

◆

Colics of the Horse.

K. M. GRANT, Government Veterinary Officer.

COLIC is the name given indiscriminately to most kinds of abdominal pain occurring in horses. Under this title, therefore, may be included most of the serious sicknesses of horses in Australia, as we are luckily free from most of the epidemic horse diseases of older countries, such as glanders and encephalomyelitis. Those most commonly encountered by the farmer are spasmodic colic, impaction colic and enteritis and these only will be considered in this article.

Causes.

Fundamentally, the basis of most attacks of colic are errors in management and feeding. Some horses seem especially predisposed to attacks, either by nature or disease, such as previous attacks, worm infestation and deficiencies in diet leading to the eating of sand and bark.

Throughout centuries of breeding and selection, the horse has been changed by man from an animal which spends most of its time grazing on bulky food to one which is trained to eat concentrated foods in a relatively quick time and then to work hard on a full stomach. These changes in feeding habits have not been accompanied by a corresponding change in the arrangement of the intestines, so that what might be otherwise a trifling digestive upset may have serious consequences in the horse.

Spasmodic Colic.

Simple spasmodic colic is usually caused by sudden chills or irritant food. Watering after feeding or cold water when overheated are frequent causes. Exposure to cold and wet, especially when the coat is long and rough, may bring on an attack. Fermentation of musty hay or spoiled grain is probably the most common source of the trouble.

Impaction Colic.

Impaction colic or obstipation is the most common form observed under Australian conditions. It is caused by the accumulation of faecal matter in the intestines leading to partial or complete blockage. Dry, stalky feed, such as poor hay, dry grazing, paddymelon vines or corn husks often cause trouble. The eating of sand, either as a mixture with chaff, in short grazing on sandy country, or in mineral-deficient animals (leading to a craving for abnormal food) is a frequent cause. Interference with the blood supply of the intestine by larval worms which have caused blockages in the blood vessels may predispose the animal to repeated attacks. Sudden changes from concentrated to bulky food, such as at the end of the ploughing season, frequently cause obstipation.

It may also occur in old and debilitated animals because of weakness of the intestinal muscles, in spite of good feeding and management. Lack of attention to the teeth, by causing the swallowing of coarse, badly masticated food, frequently gives rise to the condition.

Enteritis.

The term enteritis may be used roughly to include a number of quickly fatal conditions of the intestines of the horse. It may sometimes be caused by infectious diseases, such as anthrax or haemorrhagic septicæmia, but is usually a complication arising from previous obstruction colic. Twisting of the intestine and gut-tie (telescoping of one piece of intestine into another, with subsequent rotting of the telescoped piece) may be conveniently grouped under this heading. An opening (usually caused by external violence) may exist unsuspected for a considerable time in the diaphragm or the caul without causing obvious symptoms until a loop of intestine is caught in it, leading to rapid death from enteritis.

Symptoms.

As the rational treatment of colic depends on its assignment to one of the groups described, it is very necessary to be able to recognise them. Rectal examination is one of the best clues in many cases, and the stockowner who is interested in the subject may easily familiarize himself with the normal animal by repeated examinations. He is then in a position to appreciate any deviation from the normal. Examination is carried out by inserting a well lubricated hand and arm into the rectum. Parts of the large and small intestine may be recognised by feel through the wall of the rectum and in small horses it is possible to recognise the border of the left kidney. It can be readily determined whether the intestines are abnormally full of faecal matter or gas. In some cases twists and obstructions (calculi) may be felt. The condition of the mucous membrane of the rectum is also useful in forming a diagnosis. Provided reasonable care is observed the examination is without risk. The finger-nails should be cut short to avoid damage to the wall of the rectum and violent movements of the hand should be avoided. Service hobbles may be used to reduce risk to the operator. The left hand should be used to examine the right side and vice versa.

Spasmodic colic is sudden in its onset, with marked abdominal pain, kicking of the abdomen and periods of violent rolling. Between paroxysms the animal appears dull, but otherwise fairly normal. The eyes are bloodshot, but not staring. Attacks of pain usually last about 15 minutes and may come on every hour or so. Some scouring is usually noticed and the intestinal sounds (which may be heard by putting the head to the flank) are increased. These sounds frequently sound like water gurgling back and forth. The attack usually passes off in 12-24 hours without any complications.

Impaction colic is much slower in its onset than spasmodic colic, the horse being noticed dull for a day or so before any evidence of pain is shown. The eye is rather dirty and may be slightly yellow. Small amounts of dung may be passed for a time and then cease altogether. Intestinal sounds are absent or very weak. The recurrence of these during treatment is a favourable sign. Violent rolling is seldom noticed but the animal appears more or less constantly in pain, pawing and looking repeatedly to the abdomen. When down he usually lies at full length and looks round frequently at the abdomen. The gait is stiff and jerky. On rectal examination the increase in the consistency of the intestines can be noted and the rectum itself is ballooned so that no difficulty is experienced in inserting the hand. Retention of the urine (so called "water gripes") is frequently noted. Relief of this condition may be necessary if the impaction persists more than 36 hours, but as it is due merely to pressure preventing the emptying of the bladder, it will be relieved automatically as the animal improves. It is this fact which has led farmers to place undue emphasis on the relief of this condition.

In sand impaction the sand may be seen by washing samples of dung. In cases where the small intestine is involved the onset of symptoms is more sudden and severe, but otherwise very similar symptoms are noted.

Cases recognised early and rationally treated usually respond but enteritis may develop with fatal results.

The onset of enteritis is sudden and severe from the start. Violent colicy pains, rolling, and switching are shown without intermission. The membranes of the eye are beef-red and the body temperature up to 105 F. Death may follow in about six hours. Animals strain frequently and pass small quantities of foul smelling dung. Although the body temperature is so high, the extremities and the ears are cold. The animal becomes bathed in sweat and shivers violently. The mucous membranes of the rectum are irritable and cling to the hand when it is inserted. Rubbing of the belly causes pain and is strongly resented by the patient.

Treatment.

As all kinds of colic may lead to serious complications, it is advisable to get competent veterinary advice as soon as possible, but failing this, home treatment is usually effective if intelligently applied. An intelligent diagnosis is essential and much harm may be done and much pain inflicted on the animal by the routine use of violent purgatives in all cases of colic.

In spasmodic colic 2 ounces of turpentine and 1½ pints (beerbottle full) of raw linseed oil is usually sufficient to bring speedy relief. Boiled linseed oil must NOT be used. One ounce of spirits of chloroform may be used to control the pain, but must be well diluted with oil or water.

Diet during and after recovery is most important and feeds should be light and easily digested, such as hay and small amounts of crushed oats. Bran mashes made by damping a half bucket of bran with *boiling* water and adding a tablespoonful of salt are useful. The mash should be allowed to steam with a bag over it for half an hour.

In impaction colic it is first necessary to soften the impacted mass with long enemas before any attempt is made to evacuate it. The use of violent purgatives before the mass is softened will do very little good and may lead to rupture of the weakened intestinal wall. A stirrup pump with the brass nozzle removed is the most convenient instrument to use. As these pumps are often used on farms for arsenical sprays, great care should be exercised to ensure that the hose is quite clean. If any doubt exists several buckets of water should be run through the pump first. The hose should be greased with vaseline or soap and first inserted only a few inches. As water is slowly pumped in, the rectum will balloon ahead of the tube and it may be introduced cautiously 3 to 4 feet. Large quantities of warm, soapy water (up to 8 gallons) should be used and repeated as often as necessary. If the water is ejected soon after administration the enema should be repeated. Repeated enemas tend to soften the impacted mass and assist its gradual expulsion. The use of water introduced through the mouth by means of a stomach tube is very beneficial but this is best left to the expert. Leading the horse slowly improves the effect of the enema. The enema should be followed by a quick purgative such as 2 ounces of Barbadoes aloes dissolved in hot water, or liquid paraffin (3 pints). "Lentin" is used with much success, but due to the danger of rupture of the bowel, should only be used under direct veterinary supervision.

Plenty of water and small amounts of appetizing green feed should be provided. In sand colic this treatment may require repeating for several weeks.

The ordinary physic ball is too slow and uncertain in its effects to be reliable. Liquid paraffin may be repeated daily until the bowels are moving freely. Tonic balls of nux vomica and ammonium carbonate may then be given daily for a week until the healthy condition of the bowel is regained.

Home treatment of enteritis or of twist of the bowel is of very little use and all that can be done is to relieve the suffering for the time being with 1-2 ounces of chloral hydrate given either as a ball or in thin porridge, until skilled attention is available. Treatment of this group of conditions with violent purgatives is both barbarous and useless. Surgical intervention offers very little hope and is a very highly skilled procedure.

Treatment of valuable horses with sulphanilamide may be successful but is costly and quite useless where there is any organic lesion such as twist or strangulation of the intestine. An initial dose of 3 ounces of sulphanilamide should be given followed by 1½ ounces twice daily. This will only be effective in certain cases.

Prevention.

It is possible to prevent many cases of colic if reasonable care is exercised in the feeding and management of working horses.

It should be remembered that horses cannot rapidly adapt themselves to change and that any variation in feeding or working habits should be as gradual as possible. Most cases of colic occur either during ploughing and harvesting when horses are suddenly put on to concentrated feed and hard work or immediately after when they are turned out to rough grazing.

Where the feed is very dry a pint of dilute molasses or a few tablespoonsful of raw linseed oil should be poured over the feeds after they are prepared. Excess quantities of dry stalky fodder such as paddymelon vines or corn stalks should be avoided. Many attacks of colic have been caused by the feeding of mouldy or spoiled grain to horses although the same fodder has been fed to cattle and pigs without any untoward effects. Naturally horses should not be allowed to gorge themselves on any grain, especially wheat.

Horses should not be brought in hot out of the paddock and watered immediately but should be allowed, if possible, to cool down gradually. It is usually possible to see that they are not worked hard over the last quarter of an hour's ploughing and then by the time they are unyoked and slowly walked into the yards, they are sufficiently cool.

Bad teeth, leading to poor mastication, should be attended to promptly and worms eradicated by regular treatment of all the horses on the property, not only those showing symptoms of infection.

Although the monetary value of draught horses may not be very high at the present time, colic usually deprives the farmer of the use of his team at ploughing or harvest time when it is very difficult to replace a horse and considerable loss of valuable time is suffered. Attention to details of horse management at these times is amply repaid in a healthy and efficient team.

Warts in Cattle.

A. K. SUTHERLAND, Veterinary Officer, Animal Health Station, Yeerongpilly.

WARTS are the result of infection of the skin with an extremely minute organism, known as a virus. The infection causes an excessive growth of skin tissue, and can be responsible for financial loss. This loss is brought about—

(*a*) by loss of condition and stunting of seriously affected calves;

(*b*) by reduction in the value of hides;

(*c*) by reduced sale value, particularly of purebred stock.

Warts are common in calves and yearlings, and occasionally cows are affected on the udder and teats.

The disease is contagious, and infection probably occurs when small abrasions of the skin come in contact with warty animals or with fences, buildings, rubbing posts, or other structures which affected animals have touched. To prevent the disease it is therefore important that affected animals be isolated. This is best accomplished by moving the healthy calves to clean pens or paddocks.

Warts are most common on the head, neck, and shoulders. Other parts of the body are occasionally affected. The infections usually commence as small nodular growths, which later develop rapidly into horny cauliflower-like masses up to several inches in diameter. Some calves develop one or two small warts and are thereafter immune, whereas in other calves the growths enlarge and spread until perhaps most of the head and the neck are covered with large ugly growths. The latter is particularly likely to occur in calves which are overcrowded or suffering from malnutrition or worm infestation.

Treatment.

Calves with warts always eventually clear up even if no treatment is applied. However, this natural recovery may take a long time, so some treatment should be given to hasten it.

Many warts can be removed simply by clipping them off close to the skin with clean, sharp, curved scissors. The cut surface bleeds for a time, but this is of no consequence, unless the growths are very large. The stump should be treated with tincture of iodine, glacial acetic acid, or a caustic pencil.

This method of surgical removal cannot be applied when a large area of the calf's skin is involved. Nevertheless, a surprising number of warts can be cut off without any ill effects resulting. It has been stated that when a few large warts are cut off the development of immunity and the tendency to recovery are accelerated, but in view of the fact that, in time, the growths disappear without any treatment, it is difficult to verify this.

Another method of removing warts is to tie a ligature of linen thread or catgut tightly round the base of the wart and tighten it every day or so until the growth sloughs off. This method should be used for large growths.

A third method which has been used with some success is to paint the warts daily with castor oil.

If the calves are suffering from malnutrition or worm infestation, their chance of developing immunity and so recovering from warts will be increased if the feeding is improved and worm infestation is treated by drenching with phenothiazine.

Prevention.

It is important to remember that warts are contagious and that every wart contains virus which may infect another calf. Thus, if only a few calves are affected, they should be isolated and treated as described above. Prompt detection of cases and removal of warts will also limit the spread of infection.

As with most infectious diseases, some animals have a natural immunity, so that in some herds the spread of the disease may be limited. However, as it is impossible to know the extent of natural immunity in a herd until an outbreak has run its course, it is wise to adopt preventive measures.

A vaccine has been used for both the treatment and prevention of warts. Remembering the tendency for the disease to clear up spontaneously, the results obtained by subcutaneous injection of formolised vaccine have not been highly successful and the procedure cannot be recommended as an efficient preventive.

THE COUNTRYMAN'S SESSION

Sunday Morning Radio Service to Farmers

(By arrangement with the Australian Broadcasting Commission)

Farmers are recommended to tune in to either a
Queensland National or Regional Station.

EVERY SUNDAY AT 9.30 a.m.

Agricultural Chemistry

Water for Livestock.

(Supplied by the Biochemistry Section.)

ORCHARDISTS and market gardeners have a rule of thumb for deciding if a saline water is unsuitable for irrigation—if it tastes brackish it is unsuitable.

There is no such rule in accessing the suitability of water for animals. Subterranean waters may have no brackish taste and yet be dangerous to stock, for example, through traces of fluorides. On the other hand, they may be quite distasteful to humans, through dissolved salts, and yet prove satisfactory for stock. The only reasonably sound method is to have the water analysed and an interpretation made by a competent person.

If temperature, turbidity, and pollution are excluded, then the main factors governing the suitability of water for stock are—

(1) Nature and amount of dissolved salts.

(2) Class and age of animal.

(3) Purpose for which used.

(4) Previous history of stock.

(5) Available foods.

An example from each of these groups will serve to illustrate the point.

(1) Beef cattle experience no disability if the drinking water contains 400 grains per gallon of common salt (sodium chloride) and only traces of other salts. Yet a similar level of magnesium or calcium chlorides (common constituents of saline waters) renders the water so distasteful that cattle have to be dying of thirst before they take even a swallow.

The amount of dissolved salt hardly calls for comment.

(2) The tolerance of sheep to highly saline waters is well known. In fact, sheep will thrive on water which is toxic to cattle. Young animals are unable to tolerate the degree of salinity which old animals take with impunity.

(3) While dairy cows will drink sufficient quantities of certain saline waters to meet normal body requirements, they frequently refuse to drink sufficient to meet the demands of full lactation and consequently milk production drops.

(4) Stock accustomed to fresh water frequently refuse saline water which locally bred stock take freely.

Travelling stock may suffer mortalities from a supply which local animals use regularly.

(5) Stock obtaining a reasonably high proportion of their moisture requirements from succulent feed will drink salt water which they ignore when only dry feed is available.

Hence the importance of having water analysed when there is any reason for suspecting its value should commend itself to all stock owners.

The service is free to producers. A clean 26-oz. bottle, rinsed twice with the water to be sampled, should be filled, securely stoppered and packed, and addressed to the Department of Agriculture and Stock, Brisbane, if posted, and to the Department of Agriculture and Stock, Roma street, if railed. The name and address of the owner should be on the parcel.

Information regarding the source of water, purpose for which to be used, and other relevant matters should be sent in an accompanying letter.

A VALUABLE CONTRIBUTION TO FORESTRY.

Review of "The Biology, Economic Importance and Control of The Pine Bark Weevil (Aesiotes notabilis Pasc.), by A. R. Brimblecombe, M.Sc."

This excellent paper was published in the "Queensland Journal of Agricultural Science," Vol. 2, No. 1, March, 1945, and reprints are available from the Queensland Forest Service.

The work is outstanding as a contribution to science from the purely technical point of view, but it is also extremely valuable from the point of view of forest management in Queensland and New South Wales. The programme of hoop pine planting in Queensland is more advanced than that in New South Wales, and the time is approaching when pruning must be commenced in the Southern State. Mr. Brimblecombe's work in Queensland will give us an advantage in combating the destructive pine bark weevil.

Mr. Brimblecombe has shown in his paper that pruning operations give the weevil an opportunity to attack plantation trees and the result is malformation and sometimes death of the trees. Detailed studies of the conditions favourable to attack led to his recommendation that pruning operations should be carried out only in dry, cold weather. In this way economic damage by the insect has been eliminated.

In a very brief review it is impossible to do justice to what is probably the most detailed study of a single Australian insect yet undertaken. The work includes data on ecology, meteorology, the form, life-cycle and habits of the weevil, with details of its natural enemies. It also outlines various methods of control, both chemical and silvicultural, attempted in the author's investigations.

Successful control of the pine bark weevil means a huge financial saving to both Queensland and New South Wales. It is capable of attacking introduced pines as well as hoop pine.

K. L. TAYLOR,
Forest Entomologist, Forestry Commission of New South Wales,
in *The Australian Timber Journal* for February.

GENERAL NOTES

Staff Changes and Appointments.

Mr. J. Shilkin, Veterinary Officer attached to the Veterinary Staff of the Department of Agriculture and Stock, Brisbane, who was engaged on milk investigation for the Department and the Brisbane Milk Board, has tendered his resignation.

The resignation of Mr. W. B. Horneman, Dairy Adviser, Department of Agriculture and Stock, Kingaroy, has been accepted as tendered.

Open Season for Duck and Quail.

Following the decision of the Government to declare an open season for duck and quail in Queensland this year, an Order in Council has been issued to-day under *The Fauna Protection Act of* 1937 to make provision for an open season. The effect of this Order in Council is to fix the open season for duck and quail in Southern Queensland from 1st May, 1946, to 31st July, 1946, both inclusive, and in Central and Northern Queensland from 1st July, 1946, to 30th September, 1946, both inclusive.

The attention of shooters is drawn to an Order in Council which prescribes that twenty (20) duck and twenty-five (25) quail are the maximum numbers, respectively, which any one person may take during a period of twenty-four hours.

Cessation of Bran and Pollard Rationing.

The Minister for Agriculture and Stock (Mr. H. H. Collins, M.L.A.) has announced that an Order issued by the Minister for Commerce and Agriculture appeared in the Commonwealth Gazette of the 25th March, revoking restrictions of sales of bran and pollard. This in effect, said the Minister, means that the rationing of bran and pollard has now ceased as control no longer exists over these commodities. The issue of permits for bran and pollard will therefore be automatically discontinued.

Maturity Standard for Citrus Fruits.

The Minister for Agriculture and Stock (Mr. H. H. Collins) has announced an amendment of *The Fruit and Vegetable Grading and Packing Regulations* to provide a new maturity standard for citrus fruits. The new standard, which will be enforced forthwith, is similar to that specified in the *Commonwealth Export Regulations* and the *Fruit and Vegetable Regulations* of New South Wales, Victoria, and South Australia.

Under the *Fruit and Vegetables Acts*, the maturity standard for citrus fruits was based on acid content only, and it is thought desirable, in order to prevent the marketing of immature citrus fruits, that the maturity standard for these fruits should be based on flavour as well as on acidity.

It is also important that the method of determining the juice content of oranges and the number of fruits to be taken by inspectors for an analysis should be specified, as the juice content varies with the method of extraction and with the size of the sample.

Peanut Board.

An Order in Council has been issued under the *Primary Producers' Organisation and Marketing Acts* giving notice of intention to extend the operations of the Peanut Board for a further period from 28th August, 1947, to 27th August, 1958.

Growers who are engaged in the production of peanuts and have supplied their product to the Board may, on or before the 13th May, 1946, lodge a petition with the Department of Agriculture and Stock for a poll on the question of whether or not the operations of the Peanut Board should be extended as above.

Rural Topics

Facts About Pigs.

Two facts of especial interest to beginners in pig raising are the remarkable capacity of a pig for utilizing its food to advantage, and that pigs mature earlier than any other domestic animal. Pigs gain 1 lb. live weight for every 5 lb. meal eaten; sheep 1 lb. live weight for every 8 lb. meal; and cattle 1 lb. live weight for every 10-15 lb. meal.

The figure of 5 lb. meal given for the pig is, of course, an outside figure. Pigs can and frequently do, put on 1 lb. of live weight for 3½ lb. of food consumed, which emphasizes still more the comparative efficiency of the pig's digestive system.

The earlier maturity of the pig ensures a more rapid turnover on capital, with obvious benefit to the farmer. As an illustration Henry and Morrison are quoted:—The calf doubles its birth weight in 47 days, the lamb doubles its birth weight in 15 days, the pig doubles its birth weight in 10 days.

The average sow will produce 12-14 offspring yearly, as compared with one (perhaps two) by cattle and sheep.

A Breeze from the Briny.

In a recent issue of the *Dairy Farmer*, an English monthly devoted to the cause of better methods, better milk, and better marketing, is a breezy article well worth quoting. Written by a Navy man who (like so many others who go down to the sea in ships) has realised an ambition (born and cherished, no doubt, in the midnight watches on the ocean wave) to own a bit of land to live and work on when he had swallowed the anchor and had bidden good-bye to the rolling sea, the article couldn't be anything else but breezy. The writer, Commander Stephen King-Hall, has made a success of his little farm and (among other bright things) here are a few tit-bits:—

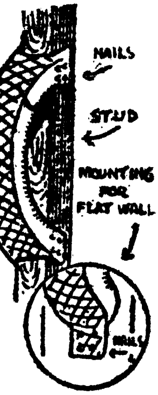
"There's a lot of money to be made out of farming in the right way (by those who are stupid enough to want a lot of money) without help from anyone and by intelligent, scientifically-trained men with a bit of capital and the right land who meet the market, and who realise that their best bet is a highly paid industrial population ready to pay a good price for home-grown fresh food, such as dairy produce and so forth. . . . Every intelligent farmer ought to run a substantial side line. . . . If you want State control in agriculture, squeal for subsidies; if you don't, keep your mouth shut and support your own organisation for orderly marketing.

"There's nothing more holy or uplifting in digging a hole in the ground and planting a potato in it than in stopping a hole in a tooth so as to eat the potato. So please spare us the 'mystic' approach to agriculture. Don't pose as a public benefactor and an applicant for public assistance at the same time."

There is a lot more in this constructively critical strain, and all written with a cheery chuckle. The breezy old sea dog winds up with this: "And remember an exactly similar article could be written about any other calling. . . . The only job I know which is more or less immune from criticism is the job of the housewife, who is unpaid and shockingly equipped. The trouble is that at the present time we are sitting down complacently surveying our glorious past instead of working like 'billy-o' as a united nation to build up a glorious future. However, we shall learn by experience, but, it will be painful."

One side slant from this stimulating and provocative article is that if the farmer doesn't organise his own industry co-operatively and completely, some other crowd may do the organising for him, and that will be the end of the farmer's freedom.

GADGETS AND WRINKLES



A BUMPER BAR BUFFER.

To avoid jolts of the car in a garage mount two halves of an old car or truck tyre on the wall as shown in the diagram. The heavier the construction of the tyre the better.

TEETH TELL THE AGE OF CATTLE.

It is possible to tell the approximate age of cattle up to four years by their teeth as follows:—

All four temporary incisors on each side of lower jaw have erupted at birth or soon afterwards.

At 1 year 9 months the permanent central incisors erupt.

A 2 years 3 months the permanent lateral central incisors erupt.

At 2 years 9 months the permanent lateral incisors erupt.

At 3 years 3 months the permanent corner incisors erupt.

Although specific ages are given at which the teeth normally appear, variations from the normal are not infrequent. Thus, in station-bred or late-maturing cattle the teeth may be three months late in appearing, whereas in specially-bred cattle produced and prepared for show purposes the teeth may appear three months earlier than the ages stated. Three months normally elapse from eruption of the teeth until they are in full wear.

The eight temporary incisor teeth of cattle are present at birth or soon afterwards. At the same time the young calf is provided with three temporary molar teeth in each side of the jaw, above and below. These three molar teeth are described as 1st, 2nd, and 3rd molars.

In the course of time all of these temporary teeth are replaced by permanent teeth, and at the same time three additional molar teeth of a permanent type are added. These three are known as the 4th, 5th, and 6th molars.

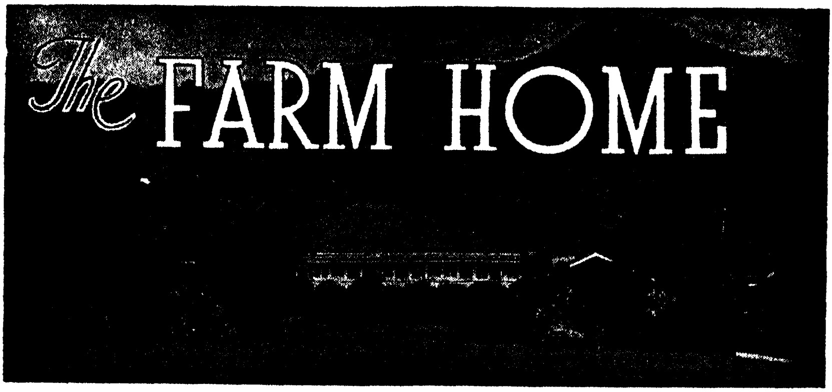
The 4th molar tooth, on each side of the jaw, appears as a permanent tooth at 6 months of age. The 5th molar tooth, also a permanent one, is cut at 15 months of age.

At 2 years of age the central incisor teeth have been replaced by two permanent teeth of a stronger and broader type. At this age the 6th molar tooth is also cut.

At 2½ years of age the next pair of incisor teeth are usually up, as well as the 1st and 2nd permanent molars.

At 3 years of age another pair of incisor teeth, known as laterals, are up, and usually in full wear, and the 3rd permanent molar is up.

At 3½ years of age the last pair of incisor teeth, known as corner broad teeth, are usually up and in full wear. These latter two teeth are more erratic than others in their time of appearance.—*New Zealand Journal of Agriculture.*



Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

THE FATHER'S SHARE IN THE CARE OF HIS CHILDREN.

ONE of our Queensland Child Welfare sisters, at present doing some demonstration work in Victoria, writes as follows:—"One morning I had an audience of about thirty big school boys who showed keen interest in the bathing and proper handling of baby. I showed them the easiest and most practical way of doing this. These future fathers may be glad some day that they had this little lesson in 'Mothercraft.'"

The captain of a big vessel does not actually steer his vessel himself, but because he is responsible for passengers and crew, he must see that it is properly done, and therefore he himself should know how it should be done.

Now that so many of our returned service men are re-establishing their homes, learning to "get along" with the small sons and daughters who have had so little share in daddy's life during the war years, it is practical to consider what should be the father's part in the care of his children.

Admittedly, the father is not at home sufficiently to see to the children's wants himself, but because he has a half-share in the responsibility for their health and well-being, it is part of his job to see that they are properly cared for. To do this, he should set out to learn what is involved in starting his little girls and boys out in life with sound minds in sound bodies.

What Father can do.

If a new baby is coming he can see that his wife gets the proper food and takes care of her own health. He can help her to see how important it is that early in her pregnancy she should attend the doctor who is to look after her confinement or an antenatal clinic. She must also go to the dentist. A father can help his wife a great deal at this time, carry heavy weights, fetch the wood or water, and take her a cup of tea in the morning if she is sick or very tired. He can avoid bringing his own worries and anxieties home more than is absolutely necessary, because the mother-to-be must be encouraged to have a bright and cheerful outlook.

After the baby is born, the father should see that it is fed by the mother herself. He should have read the books on the subject, and should know why the natural feeding of baby is so important.

He should refuse to allow a dummy to be given, because this spoils the shape of the child's mouth and dental arch and establishes a big risk of disease.

If the baby cries during the night, the father should not grumble and urge his wife to feed the baby, but rather by a few sympathetic words and timely help assure his wife that he is anxious for her to do as her doctor or sister at the welfare centre told her, and help her to find out why the baby is cross.

The father should take an interest in the baby's progress, see the baby's card after each visit to the welfare centre, and make it easy for his wife to attend the centre regularly.

The wise father does not say "I don't believe in it" when his wife tells him that she has been advised to have the child immunised, or his teeth treated, but will go and see the doctor himself and find out his reasons for giving such advice. He must know which foods are best for children, which are harmful, and why.

Early to bed is the best rule for children. The father can give them more time at week-ends if they are asleep in bed when he arrives home from work.

Good management and good example are most important in forming children's characters. Fathers are just as important as mothers in training the characters of their children. Fathers may study hard for the trade or profession which brings in the means of livelihood for the family, and should be prepared to study equally hard how to be good fathers. Advice about books on child management and help for fathers in their responsible task, together with any other information concerning child management, can be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau*, 184 *St. Paul's Terrace, Brisbane*, or by addressing letters, "*Baby Clinic, Brisbane*." These letters need not be stamped.

◆

IN THE FARM KITCHEN.

Savory Cabbage.

Remove the butt of the cabbage and wash each leaf under running water, scrubbing if necessary. Gather the leaves together again and cut them in shreds as you would a lettuce. Put a lump of butter—about an ounce for a small cabbage—in a saucepan. Put in the cabbage. Add pepper and ½-cup hot water and salt; then add four or five bacon bones or a small ham bone. Bury them slightly under the cabbage. Cover the pan tightly and bring to the boil. Shake the pan and lower the temperature. Allow to steam very gently, shaking the pan now and then for about twenty-five or thirty minutes, till the cabbage is soft enough. Do not raise the lid more than necessary, so allowing the steam to escape. When cooked remove the bones and chop the cabbage through several times. There should be no water to drain off.

Savory cabbage served with fried sausages makes a delicious dish.

Horseradish Sauce.

1 cup stock	Grated horseradish
1 tablespoon flour	Salt and pepper

Moisten the flour with a little cold water, and add the thickening to the hot stock. Cook the mixture until it is smooth and clear. Season with salt and pepper. Just before serving it add as much horseradish as desired.

Carrot Jam.

Ingredients.—Four or five carrots (large), seven large lemons, eight cups cold water, 4 lb. sugar.

Method.—Wash and dry the lemons, cut in halves and squeeze juice out. Soak the halves in slightly salted water overnight. Next day boil lemon skins in fresh water until soft. Remove all the white, and cut the skin into fine strips. Wash, scrape and grate carrots and soak in half the water overnight. Add remainder of water, lemon rind, boil gently until tender—about 1 hour. Add heated sugar and lemon juice and boil quickly until it is well set—three-quarters to one hour.

Scrap Fritters.

One pint frying batter made with wholemeal flour, 3 tablespoons cold cooked vegetables or meat scraps or fish left-overs, according to what larder contains. Cut up into small pieces, add to batter, stir, and fry as fritters. If there should be left-overs of fruit, these can be used instead and the fritters made into a sweet instead of a savoury dish.

QUEENSLAND WEATHER IN APRIL.

Queensland, generally speaking, experienced an exceptionally dry month, average district rainfall totals being the lowest April recordings since April, 1938, except in the southern coastal belt of the South Coast Moreton Division and parts of the Darling Downs West and Maranoa Divisions where over average aggregate totals occurred. The better rainfall distribution in these areas was due to the heavy to local flood rain accompanying a cyclone centred off-shore during the first week. Stations in the Western, Central, South-west and Carpentaria Divisions, with very few exceptions, reported no rain, and following on the dry months of February and March, the dry April conditions have resulted in insufficient winter feed being assured for pastoral requirements, unless substantial early falls occur in May. Low rainfall totals in the North and Central Coast Divisions have resulted in young sugar crops suffering a set-back, and this season's yield will be decreased accordingly. The dry spell continues in the Port Curtis Division (68 per cent.) below normal, and in the Callide and Dawson Valleys relief is required for agricultural purposes.

Flooding.—The rainfall accompanying the offshore cyclonic depression from the 2nd to 5th caused moderate rises in the Mary and Stanley Rivers, where local flooding occurred. At Murrumba, where the Brisbane River rose to 15 feet, 3 feet over the traffic bridge, on 6th, conditions are indicative of the temporary traffic dislocation which occurred in these areas. Some heavy falls 3rd/4th included a few 8 to 12 inch amounts—Springbrook 1,290, Bald Knob 881, Cooroy 806. The run-off from moderate rains in the Darling Downs and Maranoa Divisions resulted in light freshes in all streams in those areas, the Balonne at St. George and Surat rising to 8 feet 6 inches, 6 inches above the reporting height of 8 feet.

Pressure.—At the end of March another cyclonic centre was operating over Ocean Areas between Willis Island and the New Hebrides. This centre gradually moved south-west accompanied by rough south-easterly weather on the coast south from Mackay till the 5th. On the 1st, the centre below 29.7 inches was approximately 200/250 miles south-east from Willis Island, and by 9 a.m. Wednesday it was 200 miles north-east from Rockhampton, moving south-west to south. On the 4th, the centre below 29.5 inches was located 80/100 miles east from Maryborough, fortunately moving south to south-east to the north Tasman Sea by 9 a.m. on the 5th. This centre brought the heavy to local flood rains in the Moreton district 3rd/4th. As far as Queensland was concerned, a fine weather period then accompanied that extensive continental anticyclonic control which dominated the synoptic situation until 21st. On that date, a closed depression below 29.7 inches developed in the Great Australian Bight and moved fairly rapidly eastwards to Central Victoria by 9 a.m. 23rd. The two "cold fronts" associated with this depression were insufficiently active in the Queensland region to affect weather conditions, except to cause local dust squalls in western districts and scattered showers and thunderstorms when they reached the south-east corner of the State during the 23rd/24th. The well-defined anticyclonic belt which followed this depression maintained fine weather except for isolated coastal showers until the 29th, when increasing activity along a "dip," which developed over western Queensland, began to cause rising dew points and unsettled weather in the south-west quarter and southern border districts.

Temperatures.—Maximum temperatures in the Central and Southern Interior and in the Subtropical coast areas were below normal, ranging from 0.3 deg. below at Longreach to 3.7 deg. below average at Thargomindah. On the tropical coast and in the Peninsula and Carpentaria Divisions maximum readings were above normal, varying from 1.1 above at Rockhampton to 2.4 deg. above at Georgetown. Minimum readings throughout the whole State were below normal, varying from 3.7 deg. below at Longreach to 6.4 deg. below at Georgetown. Temperatures of 100 deg. were reported from Burketown on three days, this being the only station to report century readings.

Frosts.—Except for mild conditions at the beginning of the month 1st/6th and from 19th/24th moderately sharp night temperatures were experienced with light to moderate local frosts chiefly on the Darling Downs. The lowest minimum readings reported were Bybera 9th (32 deg./23 deg.), Stanthorpe 9th (30 deg./20 deg.), and Toowoomba 28th (40 deg./30 deg.).

Brisbane.—Pressure 9 + 3 29.951 inches (normal 30.041 inches), lowest since 29.942 inches in 1938. Mean barometer reading at 1,510 (4th) 29.663 inches (lowest since 29.486 on 2/4/1931). Temperatures—mean maximum 78.5 deg. (normal 78.9 deg.), mean minimum 59.9 deg. (normal 61.4 deg.), mean temperature 69.2 deg. (normal 70.2 deg.), highest daily 84.6 deg. (6th), lowest daily 53.0 deg. (29th). Rainfall—411 points (6 days), average 366 points (12 days). Highest daily fall 281 points on 4th, highest since 546 points 5/4/1933. Highest wind gust—47 miles per hour from East at 1210 hours (1st).

The rain position is summarised below:—

Division.	Normal Mean.	Mean April, 1946.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	659	173	72 below
Peninsula South	164	29	82 ,,
Lower Carpentaria	101	Nil	100 ,,
Upper Carpentaria	115	Nil	100 ,,
North Coast, Barron	788	96	88 ,,
North Coast, Herbert	822	69	92 ,,
Central Coast, East	288	11	96 ,,
Central Coast, West	145	Nil	100 ,,
Central Highlands	150	5	97 ,,
Central Lowlands	121	Nil	100 ,,
Upper Western	57	Nil	100 ,,
Lower Western	80	Nil	100 ,,
South Coast, Port Curtis	249	92	63 ,,
South Coast, Moreton	416	418	—
Darling Downs, East	161	131	19 ,,
Darling Downs, West	119	110	8 ,,
Maranoa	129	67	48 ,,
Warrego	110	1	99 ,,
Far South-West	86	Nil	100 ,,

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

JUNE.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	6.30	5.00	Cairns	7	50	Longreach	26	43
6	6.32	5.00	Charleville	25	29	Quilpie	37	33
11	6.34	4.59	Cloncurry	36	63	Rockhampton ..	1	19
16	6.36	5.00	Cunnamulla ..	32	27	Roma	15	19
21	6.38	5.00	Dirranbandi ..	22	16	Townsville	8	42
26	6.39	5.02	Emerald	11	28	Winton	29	52
30	6.39	5.03	Hughenden ..	21	49	Warwick	6	3

TIMES OF MOONRISE AND MOONSET.

At Brisbane.

Date.	Rise.	Set.
	a.m.	p.m.
1	7.43	6.20
2	8.49	7·24
3	9.50	8.29
4	10·43	9.34
5	11.28	10.36
	p.m	
6	12.07	11.35
7	12.42	..
		a.m.
8	1.13	12.31
9	1.44	1.25
10	2.14	2.18
11	2.45	3.10
12	3.19	4.03
13	3.55	4.56
14	4.35	5.50
15	5.19	6.44
16	6.08	7.37
17	7·01	8.28
18	7.57	9.15
19	8.54	9.59
20	9.52	10.38
21	10.51	11.15
22	11.50	11.50
		p.m.
23	..	12.25
	a.m.	
24	12.51	1.01
25	1.54	1.38
26	2.59	2.21
27	4.08	3.08
28	5.18	4.02
29	6.27	5.03
30	7.32	6.08

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS)

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	11	29	26	44	0	19	28	52
6	14	23	30	39	5	15	34	45
11	24	15	40	31	15	6	46	35
16	29	10	45	25	20	0	52	28
21	23	14	39	30	14	5	45	34
26	14	25	30	41	5	16	34	48
30	10	29	26	44	0	19	28	52

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	6	51	36	64	20	50	7	43
3	6	50	36	63	20	49	7	42
5	12	43	39	59	24	45	12	36
7	21	34	45	54	30	39	19	29
9	30	29	51	50	35	35	25	25
11	40	19	57	44	42	29	33	18
13	48	11	63	38	47	24	39	12
15	52	5	66	34	50	20	43	7
17	52	4	66	34	50	20	43	6
19	47	8	62	36	47	22	38	9
21	38	17	56	43	41	27	32	17
23	28	28	50	49	34	34	24	24
25	21	38	45	56	30	41	19	33
27	12	43	39	59	24	45	12	36
30	5	52	35	64	20	50	6	43

Phases of the Moon.—First Quarter, 7th June, 2.06 a.m.; Full Moon, 15th June, 1.42 a.m.; Last Quarter, 22nd June, 11.12 p.m.; New Moon, 29th June, 2.06 p.m.

On 22nd June at 11 a.m. the Sun will reach its maximum declination North and will rise and set about 25 degrees north of true east and true west respectively. On 8th June and 23rd the Moon will rise and set at approximate true east and true west respectively.

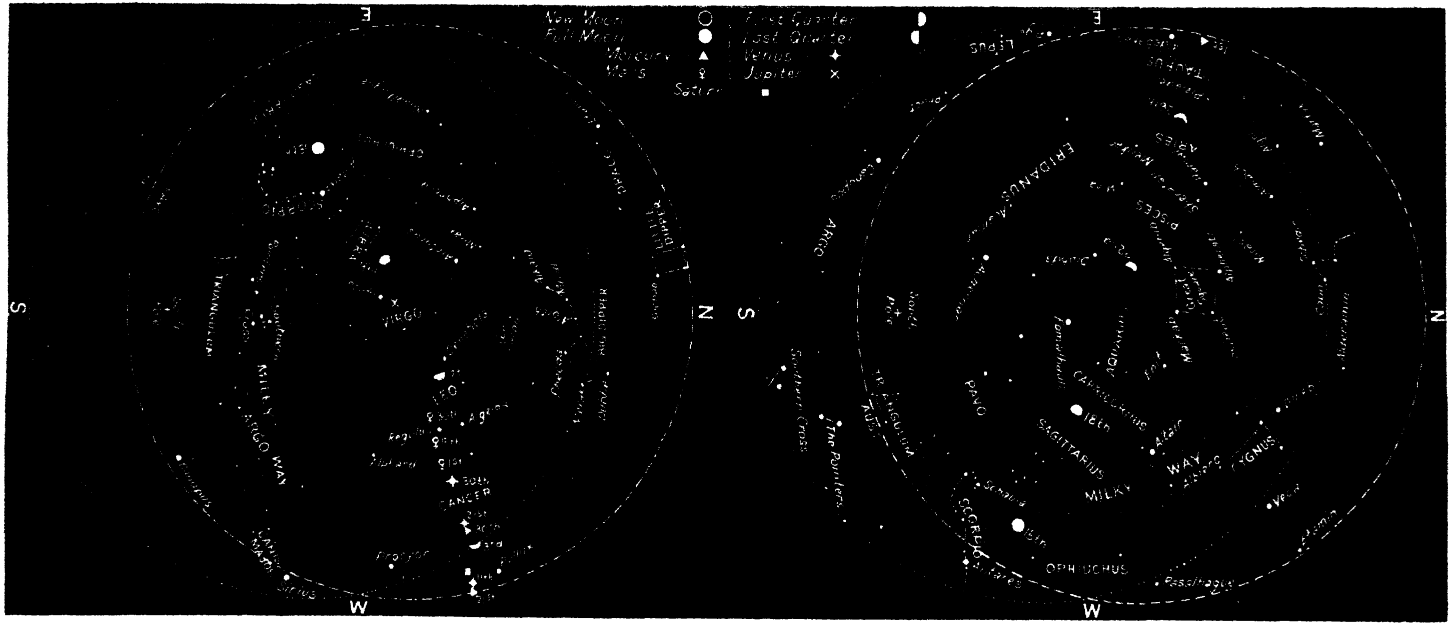
Mercury—At the beginning of the month will rise and set about the same time as the Sun while at the end of the month it will set about 2 hours after Sunset.

Venus.—Will set between 6.50 p.m. and 8 p.m. at the beginning of the month and between 7.45 p.m. and 8.45 p.m. at thet end of the month. On the 12th it will pass 2 degrees north of Saturn.

Mars.—At the beginning of the month will set between 10 p.m. and 11 p.m. and at the end of the month between 9.30 p.m. and 10.30 p.m. On the 18th it will pass less than one degree north of Regulus.

Jupiter.—Still a brilliant object, near Spica, in the evening sky. It will set between 2.30 a.m. and 3.30 a.m. at the beginning of the month and a little later than midnight at the end of the month.

Saturn.—Now beginning to pass out of the evening sky. It will set between 8 p.m. and 9 p.m. at the beginning of the month and between 6.15 p.m. and 7.30 p.m. at the end of the month.



Star Charts.—The chart on the left is for 7.15 p.m. in the south-east corner of Queensland to 9.15 p.m. along the Northern Territory border, on 15th April. (For every degree of Longitude we go west, Time increases 4 minutes). The chart on the right is for 10 hours later. On each chart the dashed circle is the horizon at Cape York and the dotted circle is the horizon along the New South Wales border. When facing North hold "N" at the bottom; when facing south hold "S" at the bottom, and similarly for the other directions. Only the brightest stars are included and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus, at the beginning of the month the stars will be in the positions shown, about 1 hour later than the time stated for the 15th and at the end of the month about 1 hour earlier than that time. The positions of the Moon and Planets, which are continually changing in relation to the stars, are shown for certain marked days. When no date is marked the position is for the middle of the month.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

APRIL RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Apr.	No. of years' re-cords.	Apr., 1945.	Apr., 1946.		Apr.	No. of years' re-cords.	Apr., 1945.	Apr., 1946.
North Coast.	In.		In.	In.	*South Coast—cont'd.*	In.		In.	In.
Atherton	4·42	42	6·74	2·20	Gatton College	1·86	44	1·29	..
Cairns	11·23	61	6·05	0·63	Gayndah	1·46	72	0·96	0·14
Cardwell	8·78	71	4·20	0·52	Gympie	3·43	73	1·67	4·21
Cooktown	8·69	67	4·31	1·77	Kilkivan	2·20	62	0·43	2·09
Herberton	3·73	57	2·81	0·49	Maryborough	3·81	72	1·95	2·50
Ingham	7·64	51	4·38	0·27	Nambour	6·13	47	6·39	6·92
Innisfail	20·21	62	15·73	2·64	Nanango	1·93	61	1·41	1·42
Mossman	7·41	19	4·63	0·88	Rockhampton	2·53	72	0·19	0·14
Townsville	3·29	72	1·60	0·03	Woodford	4·52	55	3·44	5·29
Central Coast.					*Darling Downs.*				
Ayr	2·77	56	1·35	0·10	Dalby	1·39	73	2·06	0·97
Bowen	2·91	72	0·70	0·19	Emu Vale	1·32	47	1·53	1·00
Charters Towers	1·54	61	0·96	Nil	Jimbour	1·42	64	1·91	0·60
Mackay	6·31	72	2·82	0·53	Miles	1·43	58	2·83	1·78
Proserpine	6·11	40	5·38	0·33	Stanthorpe	1·70	70	2·08	0·79
St. Lawrence	2·73	72	0·87	Nil	Toowoomba	2·56	71	3·61	1·19
					Warwick	1·60	78	2·11	1·22
South Coast.									
Biggenden	2·15	44	0·99	0·58	*Maranoa.*				
Bundaberg	3·25	60	0·65	2·73	Roma	1·28	69	3·10	0·25
Brisbane Bureau	3·66	94	4·32	4·11	St. George	1·29	62	0·62	0·47
Caboolture	4·48	67	3·52	4·48					
Childers	2·85	48	2·52	1·46	*Central Highlands.*				
Crohamhurst	6·68	50	6·83	8·78	Clermont	1·64	72	Nil	Nil
Esk	2·89	56	1·09	1·51	Springsure	1·56	74	0·62	Nil

CLIMATOLOGICAL TABLE FOR APRIL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Coastal.									
Cairns	..	86	68	92	6	57	19	84	6
Herberton	..	79	54	85	3, 4	44	15, 17	49	5
Townsville	..	87	65	95	5	55	26	3	1
Rockhampton	29·97	85	60	91	6	50	17	14	3
Brisbane	29·99	79	60	85	6	53	29	411	6
Darling Downs.									
Dalby	..	78	49	83	22, 23	40	9	97	4
Stanthorpe	..	70	42	76	5	30	9	79	8
Toowoomba	..	72	49	77	13	40	10	119	3
Mid-Interior.									
Georgetown	29·86	92	60	99	4	45	22, 23	Nil	
Longreach	30·04	88	57	95	3	48	24	Nil	
Mitchell	30·04	79	47	87	5, 22	36	10	2	1
Western.									
Burketown	..	94	64	100	3, 4, 5	55	19, 20	3	1
Boulia	29·99	85	56	96	30	48	21	Nil	
Thargomindah	30·05	79	54	91	4	41	27	Nil	

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

Volume 62 Part 6

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

JUNE, 1946

Issued by Direction of
THE HONOURABLE H. H. COLLINS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

PAGE.

Event and Comment—

Feeding and Breeding for Dairy Production 323
Water Supply Investigations .. 324

Field Crops—

Commercial Cotton Varieties Recommended for the 1946-47 Season .. 325

Vegetable Culture—

Soil Preparations and Transplanting of Tomatoes 328

Plant Protection—

Pests of the Peanut Crop 345

The Dairy Industry—

Percentage of Butterfat in Cream .. 354
Device for Inspecting Milk Tubes .. 356
Production Recording 357
Practical Duck-keeping 360

Animal Health—

The Use of Phenothiazine for the Treatment of Worms in Cattle .. 371

PAGE.

General Notes—

Army Buildings for Experiment Stations 376
Staff Changes and Appointments .. 376
Correspondence Course in Pig Raising 376

Answers to Correspondents—

Caustic Poison Plants 376
One of the Bottle Tree Family .. 376

Rural Topics—

This Isn't Udder Nonsense 377
Is Our Soil a Vanishing Asset? .. 377

Gadgets and Wrinkles—

A Simple Home-made Hoist for Bale Handling, &c. 378
A Bag Lifter from Bush Timber .. 378

The Farm Home—

A Sneeze Has Been Photographed .. 379
How to Prevent Colds 379
In the Farm Kitchen 380
Queensland Weather in May 381
Astronomical Data for Queensland .. 382
Rainfall in the Agricultural Districts 384
Climatological Table for May .. 384

STATE'S SEEDS ARE GOVERNMENT TESTED

	Bushel s.	d.
BEANS—Brown Beautys ..	70	0
BEANS—Canadian Wonders	82	6
BLUE LUPINS, N.Z. ..	13	6
DUN FIELD PEAS ..	15	0
SEED BARLEY	6	6
SEED WHEAT	12	0
	lb.	
PUMPKINS—Beaudesert ..	5	0
PUMPKINS—Cattle ..	2	6
RAPE—Dwarf Essex ..	1	1
RAPE—Giant Kangaroo ..	1	2

ASK FOR YOUR REQUIREMENTS

Seed Potatoes

FAMOUS BATLOW
BLUE STAR
FACTORS
Government Certified and Sealed

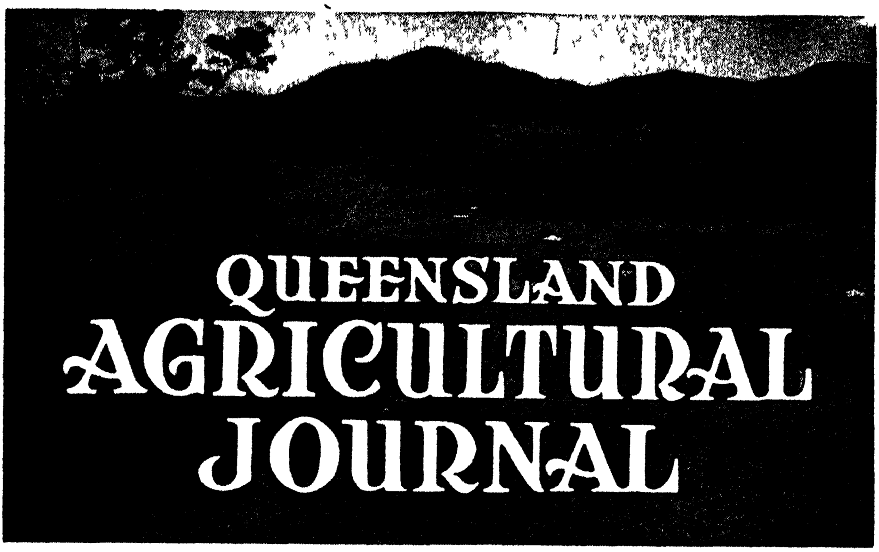
ALSO— RED STARS
At Fixed Prices—Delivery when Required
JUNE, JULY

also CARMENS, etc.

ORDER NOW —

State Produce Agency Pty. Ltd.
ROMA STREET BRISBANE

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, including postage. General Public, **Ten Shillings**, including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Volume 62 1 JUNE, 1946 Part 6

Event and Comment.

Feeding and Breeding for Dairy Production.

SPEAKING as a dairy farmer when opening the Beaudesert Show, the Minister for Agriculture and Stock (Hon. H. H. Collins) said that the remedy for low production of butter per cow was in better feeding and breeding. Until a cow got an abundance of the best feeds known to animal husbandry one did not quite know what she was capable of producing and could only form an approximate idea of her capacity. Better feeding was the starting point. Two of the best feeds were maize and lucerne, and both could be produced abundantly in the Beaudesert district. Regarding wheat, oats, barley and sorghum, the need was to produce more of those crops, use the cow for harvesting them and the butter and bacon factory for processing them. Poultry raising also could be considered as an economic combination, as food for fowls was available to the farmer at first cost.

Continuing, Mr. Collins advocated the growing of more lucerne where, as around Beaudesert, soil and climate were suitable for an expanded acreage. Where a dry spring was the usual experience, the production of pasture plants, which grew so well in the southern parts of the continent under conditions of winter rainfall, might be impracticable. But maize, lucerne, and sorghum for silage could be grown, especially as dry-time fodder reserves. If fodder crop cultivation and storage were more generally practised seasonal declines in dairy production would largely cease as a recurring anxiety. The Minister added that he had noted with pleasure that two progressive farmers of the Beaudesert district had bought machines for harvesting maize and sorghum for silage, in the use of which very little labour was involved. He suggested that such commendable enterprise could be further encouraged by district butter factory directorates purchasing similar machines for doing the job for other farmers at cost price. If the objective of more butter per cow per acre were generally adopted in mixed farming areas, he believed that extraordinary results would be achieved. Butter production, for instance, could soon be increased by at least half as much again without milking more cows, or using more land—only using it in a practical way. His Department offered farmers its co-operation in their efforts to attain such an objective. "We want to assist you. We must work together," concluded the Minister.

Water Supply Investigations.

IN a recent statement on the work of the Bureau of Investigation set up under the *Land and Water Resources Development Act*, the Minister for Lands (Hon. Arthur Jones) stressed the importance of the development of underground water resources. Investigations into these potential supplies were already proceeding under the direction of the Bureau in the Lockyer, Logan, Albert and Condamine Valleys. Similar surveys had been undertaken in the Dawson, Callide and Burnett Valleys from which valuable information had been gained. Mr. Jones added that extensive surveys to determine the available underground water and its quality were proposed by the Bureau, so as to supplement any possible surface storages or even to serve where no surface water was available. He pointed out that surface storage was subject to enormous loss through evaporation, but by tapping underground water for irrigation such waste was relatively negligible.

When developing irrigation projects dependent on subterranean supplies, Mr. Jones continued, it was most important to determine the safe yield, namely, the annual extraction which would not be more than the average annual recharge, thus so lowering the water table that the permissible cost of pumping was exceeded, or the intrusion of water of undesirable quality permitted. This determination was not easy but the Bureau was giving close attention to this factor in its plans for the development of underground water resources. The farming districts first surveyed were the Lockyer and Bremer Valleys where an aggregate of 22,000 acres was under irrigation. In recent years the number of farmers using irrigation had increased considerably and a large volume of water was drawn from gravel beds adjacent to the rivers.

The Minister added that the weiring of the Lockyer was under way, but before a complete scheme could be formulated it was necessary to inquire into the availability not only of the open waters, but also of the underground supplies; also the rate of their replenishment, so that the quantity of water which might be safely pumped from the area might be determined. This would indicate the extent to which the irrigation of additional available land, perhaps 20,000 acres, might be safely practised. The extent of fresh supplies was being measured, and it was interesting to note that 15,000 acres under irrigation used only 16,000 acre feet of water last year. The ultimate irrigated acreage in districts such as the Lockyer would depend on the rate of replenishment which, with limited basins, was a matter of major importance. It would be risky to engage in a large irrigation scheme until the re-storage rate was known. Weirs served not only to hold open water in streams, but to retard the escape of underground water or to replenish the supply. The problems of the Lockyer basin were considered typical of those likely to be met with in other parts of Queensland where underground supplies were adjacent to open water.

Field Crops

Commercial Cotton Varieties Recommended for the 1946-47 Season.

R. W. PETERS, Plant Breeder.

THE climatic conditions which operated over the main cotton belt during the 1945-46 season, whilst not so severe as the previous one, were sufficiently variable to test severely the yielding abilities of the main commercial varieties being grown, and, from the results obtained, sound recommendations can be made for seed distribution for the 1946-47 cotton planting season.

The importance of a farmer growing the most suitable variety for his conditions cannot be overestimated, and to assist him the following recommendations are made as a guidance when ordering seed that will be distributed from the Glenmore and Whinstanes ginneries respectively.

Seed Distribution from Glenmore Ginnery.

The Miller variety has once again shown its general suitability for the districts which receive their planting seed from the Glenmore ginnery. Broadly speaking, the strain lot 41S of this variety appears to be well suited for the heavier soils of these areas under either rain grown or supplementary irrigation conditions. On the very fertile heavier alluvials lot 39, which is a slightly more open type, may occasionally yield better than lot 41S. Where there is danger of attacks of the leaf sucking jassid, it is advisable to plant lot 1, which is a new jassid-resistant strain especially evolved out of Miller for such areas. Its staple length is slightly shorter than both lots 41S and 39 but its ability to produce appreciably heavier than either of these strains under conditions of severe jassid infestation makes it a valuable cotton for districts where jassids occur in most seasons.

The New Mexico Acala variety has again demonstrated that it is a good cotton for the alluvial loams and sandy loams, particularly when grown with supplementary irrigation. Under the very dry late summer and autumn conditions, the strength of some consignments of this cotton grown without irrigation on the lighter soils indicated, however, that it is highly desirable to have ample supplies of subsoil moisture in such soils at the time of planting this variety to ensure good sound fibre of 1 to $1\frac{1}{16}$ inches in length being produced. New Mexico Acala should not be planted where there is any likelihood of jassid occurring in serious numbers, as it is one of the varieties most susceptible to attack by this insect.

No other variety appears to be required in the districts south of Mackay which receive their planting seed from the Glenmore ginnery, other than on the fertile alluvial soils of the coastal strip from North Bundaberg to Mackay. A quicker-maturing cotton than either Miller or New Mexico Acala is required on such soils and Triumph lot 39–1 is recommended for such conditions

Seed Distribution from Whinstanes Ginnery.

The Lone Star variety has once again demonstrated that it is the outstanding cotton for growing on the harder, less fertile soils of the forest slopes in the Upper, Central and South Burnett and in the West Moreton districts. It has also proved to be the most successful variety on all soils save those of the softwood scrub series of the Northern Darling Downs and Maranoa districts. In the former districts lot 24 should be ordered, while in the last two areas lot 33S—a very hardy type—has yielded well over several years.

Miller lot 41 appears to be the most suitable variety for the fertile soils of the upper slopes of the forest and scrub country in all of the districts supplied from the Whinstanes ginnery; except where jassid may be anticipated, when lot 41J, a partially jassid-resistant strain, should be ordered as it has substantially out-yielded lot 41 under even moderate jassid attacks.

New Mexico Acala has again yielded well on the lower forest slopes of the South Burnett and West Moreton districts. It has shown a tendency, however, to produce rather soft cotton where unfavourable conditions have been encountered. This appears to be a weakness of this variety and in conjunction with its extreme susceptibility to attacks by jassid makes it advisable for farmers who usually grow this cotton on forest slopes to try either Miller 41 for the less fertile soils or Triumph lot 39–1 for the fertile soils.

Qualla is a big-boll, hardy variety that has yielded very satisfactorily in recent years when planted on the poorer sandy loams and sandy clay loams of the forest slopes in the West Moreton district. This appears to be about the most suitable cotton for these soils that has been tested and it is recommended that farmers with such types of soil give this variety a trial during the coming season, for it produces fibre of excellent quality. It is not suited to the fertile alluvial or scrub soils, however, where it makes vigorous growth under all but extremely droughty conditions.

Rowden, another big-bolled, hard-bodied cotton, somewhat similar to Lone Star but with a finer framework, less vegetative development and quicker fruiting, has given excellent results over the past few years. The most suitable soil type for it would be either a forest or scrub slope, where there is danger of Miller becoming too rank and vegetative, and where Triumph would be likely to suffer from short periods of heat wave and drought conditions.

Triumph.

This variety, with the exception of one commercial strain, has again, in only a moderately good season, shown its ability to yield well and to produce good quality fibre. The exception is lot 39–4 strain which, though yielding well in the Upper Burnett, produced weak fibre and for this reason, and the fact that more suitable strains are available to replace it, the whole strain is being discarded.

Lot 39–1 strain of this variety produced good yields this season in all districts where it was grown. It would appear that this cotton is well suited for the alluvial flats and the fertile lower slopes of both the forest and scrub country in the Upper and South Burnett districts and on similar soils in the West Moreton.

Lot 39–7, which is of a more open habit of growth than lot 39–1, appears well suited to the fertile alluvials of the Central Burnett and growers with such soils should order it for both rain grown and supplementary irrigation conditions.

Lot 39–2 is a slightly more vigorous type than any of the abovementioned Triumphs, and should prove most suitable for any slopes either forest or scrub not having the fertility required for lot 39–1, yet too fertile for the more robust varieties of Miller or Lone Star. The boll size of this strain is the largest of all the Triumphs.

Grow Only One Variety.

The Queensland Cotton Board has advised that in order to simplify the receival and identification of cotton arriving at the ginneries, seed of only one variety will be distributed to a grower. Each season a percentage of the growers plant more than one variety in order to have the most suitable cottons for their different soil types. This procedure not only complicates arrangements for districts to produce pure planting seed but also increases the operations connected with receiving and ginning a grower's cotton. Most farmers can undoubtedly benefit by selecting only one variety to grow on their most suitable soils for cotton and, if reasonably satisfactory returns are obtained from it at first, repeatedly growing it. In this way a farmer can determine the full possibilities of a variety for his soil—particularly if efficient cultural practices and correct row and planting spacings are carefully ascertained.

It is therefore recommended that, where a grower has obtained reasonably satisfactory results with a variety, he order seed of it for the coming season, making sure to specify the same lot number of the variety, such as Miller lot 41S and not just Miller, of which there are several strains. In some instances the district Adviser in Agriculture may desire a new strain of the same variety to be grown in order to increase the seed for general distribution in subsequent seasons. Growers should assist in this work, for only well tested strains are so released.

Wherever possible a group of farmers with comparable conditions should grow cotton on the community one variety system. By concentrating on learning how to grow to the best advantage the selected variety on their most suitable soil, the farmers will get better returns than are realised when varieties are changed yearly. This particularly applies if cotton is grown in rotation with grassland as each season provides additional evidence of the improvement in yields and quality of cotton that can be produced with this rotation.

VEGETABLE PRODUCTION

Soil Preparations and Transplanting of Tomatoes.

C. N. MORGAN, Horticulture Branch.

WHEN preparing the soil for growing tomatoes, it should be borne in mind that tomatoes are deep-rooted and after transplanting may occupy the ground for a period of up to five to six months. It is essential, therefore, to prepare the land with great care, if satisfactory results are to be assured.

If the land required for the tomatoes carries a cover crop, such as maize, a legume or weeds, it will be necessary to plough some time prior to the time it is desired to plant, in order to ensure that this vegetable matter is well rotted. The period required for the breaking down of this material varies with the time of the year and type of crop. During warm wet weather, decomposition is comparatively rapid, and young maize or Poona pea may break down in a matter of a few weeks. On the other hand, if the maize is old or the cover crop is composed of big clumps of crowsfoot grass, or the like, it will take considerably longer. During the colder months the process is much slower than during the rest of the year, and then it is essential to allow from two to three months to elapse between the first ploughing and the planting.

Tomatoes, unlike cabbage or cauliflowers, do not transplant well into soil full of vegetable matter, which, not having decomposed, has prevented the ground from settling down to reasonable firmness. For this reason, too, it is necessary to ensure that enough time has been allowed between the initial ploughing and time for planting out. Unless the vegetable cover is well rotted, not only is it impossible to have the land in good physical condition, but the decomposing material can render much plant food unavailable to the crop plant and this can prove very detrimental. When unavoidable delay has occurred, a rotary-hoe may be used before ploughing. This will help considerably in soil preparation, as the hoe cuts the cover crop into small pieces and mixes them with the soil, thus accelerating decomposition.

The land should be ploughed deeply, 8 to 10 inches usually being satisfactory, and allowed to weather until a few weeks before planting when it should be well ploughed again and then brought to good tilth with disc cultivators or harrows.

Before planting out, the land may be drilled out with a plough or other suitable implement, the drills fertilized and the fertilizer well mixed with the soil by using a scuffler.

TRANSPLANTING.

Prior to selection of the plants, it is as well to withhold the water from the seed beds for a day or two in order to harden them off slightly, as plants from seed beds overwatered or after excessive rains do not transplant well, even where irrigation is used.

Plate 108.

WELL-GROWN PLANTS BEFORE PRUNING.—Note good root development.

The day chosen for transplanting should, if possible, not be too hot, but, if this is unavoidable, all planting should be done in the afternoon. This applies particularly to farms where there is no irrigation. An hour or so before lifting the plants, the seed bed should be well watered to make sure that the plants can be removed with the least possible injury to the roots (Plate 108). The plants should then be trimmed ready for planting, by removal of all leaves except the crown (Plate 109) and then placed in a bucket of soil and water puddle or between wet bags. This trimming of the leaves lessens transpiration and minimizes wilting after transplanting. All undesirable plants should be discarded and the remainder more or less graded to size, if there is any great variation in this respect. The selection for size can be done to a large extent when choosing the plants from the seed bed, as it is often found that some portions of the bed have grown better than others. The remaining smaller plants left in the bed will very often improve in size rapidly, and allow of a planting a week or so later if necessary. The crown of plants should be kept as free of dirt as possible.

When setting the plants in the field, it is advisable to put them at least three inches deeper than they were in the seed bed. This enables the plants to root deeply and helps to keep them rigidly upright. The hole for planting may be made by hand or trowel, and should be sufficiently deep to allow the roots to fit without cramping.

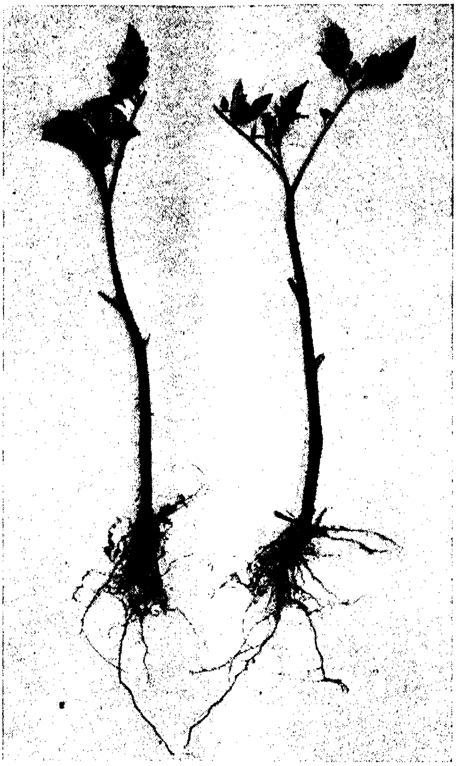


Plate 109.
PLANTS PRUNED READY FOR PLANTING.

As soon as practicable after the plants are set out they should be watered, each plant receiving a pint to a pint and a half of water. This ensures that the soil becomes well settled around the roots and that the plant will not lack for moisture over the rather important and critical period between seed bed and becoming established as a field crop. Care in transplanting is very well worthwhile; replacements are unsatisfactory. Therefore, only good well grown plants which can be handled satisfactorily over the requisite period of time should be taken from the seed bed. Straight rows assist subsequent cultivation and care should therefore be given to this point when planting out.

PLANTING SYSTEMS AND PRUNING.

The systems adopted for growing tomatoes in Queensland are:—

(1) Grown naturally on the ground without any mechanical support;
(2) Grown on a low cradle;
(3) Trellised; and
(4) Staked.

With staked crops the plants are pruned of all lateral growth. The laterals—marked "A" in Plate 110—arise at the leaf axils and around

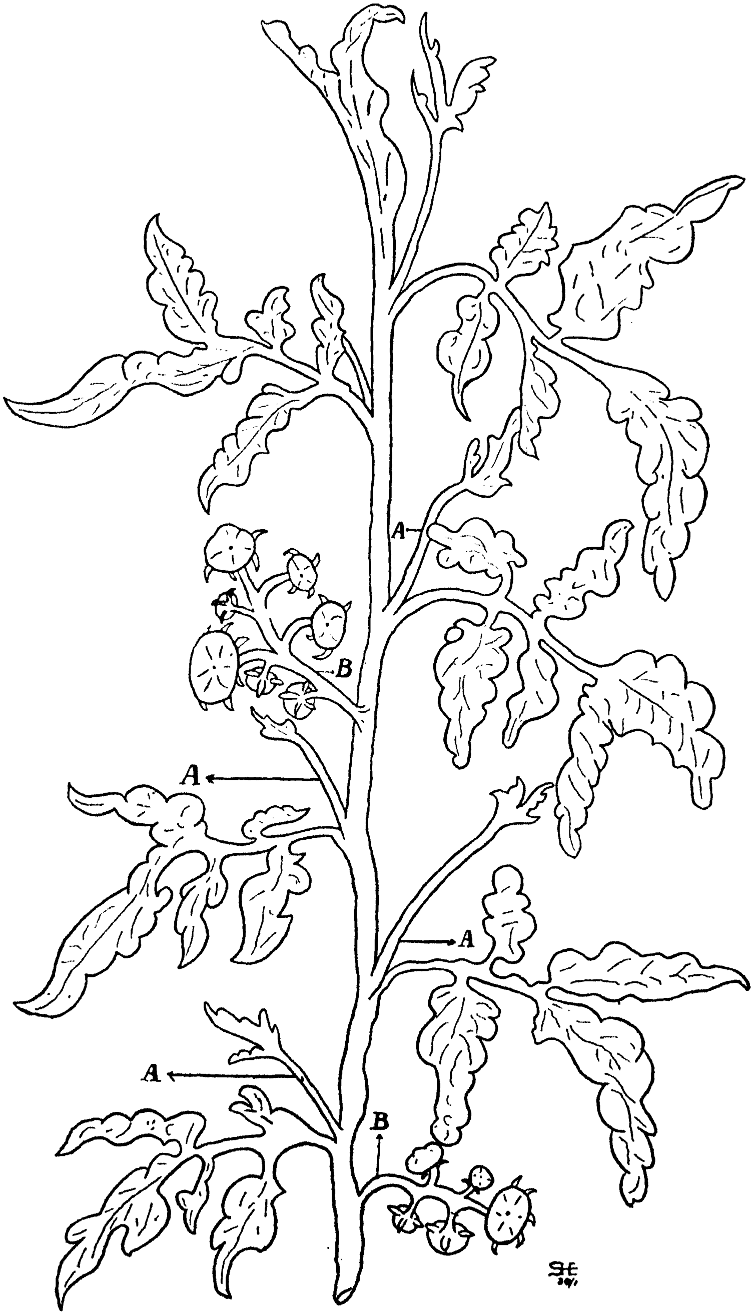


Plate 110.

SHOWING THE MAIN STEM OF A TOMATO PLANT AND ILLUSTRATING THE METHOD OF PRUNING. ALL SHOOTS MARKED "A" SHOULD BE REMOVED.

the base of the plant. They should be removed at least once every week or ten days during the growing season. In the case of trellised tomatoes which carry two stems, the lateral immediately below the first flower cluster is allowed to remain in order to form the second arm of the plant, but subsequent laterals are removed (Plate 111).

Plate 111.
SHOWING THE METHOD OF TRAINING FOR TRELLISED PLANTS.

Pruning should be done by breaking out the shoots, not cutting or pinching them out, as there is a danger of spreading disease by these latter methods. When the plants reach the top of the trellis or stake, the growing tips may be broken out if desired.

Ground Crops.

In Queensland, more tomatoes are grown as ground crops than by any other method, particularly in areas where there is no irrigation and ample ground is available. It is only in the Redlands and metropolitan areas where trellising or staking is practised extensively.

Ground crops are much cheaper to plant and maintain than crops grown by the other methods, but losses from blemishes, diseases and pests are much greater, particularly in the winter months. The bushy ground crops give far greater protection from sunburn, which is most desirable early or late in the season, than the trellised crops. Varieties such as Pearson and Pritchard are not very adaptable to trellising and may be considered suitable only as ground crops.

Planting distances vary for the the different districts—e.g., Bowen growers plant much wider apart than do growers in the Redlands or metropolitan area. Distances are influenced by variety, irrigation facilities and in some cases wind.

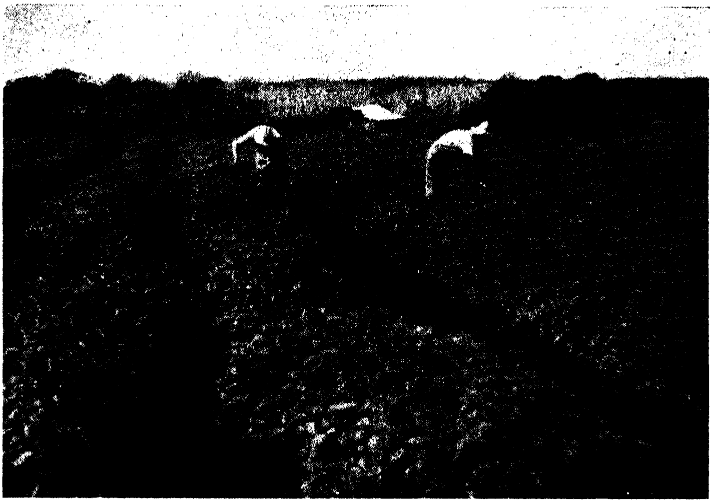


Plate 112.
AN EXCELLENT GROUND CROP OF RUTGERS AT WELLINGTON POINT.—Note compact bush.

A usual distance is 6 feet between rows and 2 feet 6 inches to 3 feet between plants in the row for varieties such as Break-o'-Day. More upright types such as Pearson or Pritchard may be planted closer. Closer planting in the rows has the advantage that plants grow together quickly and are thus not blown about so much as they would be individually. From 1,500 to 2,000 plants to the acre for ground crops should give a wide enough range to cover most conditions.

Plate 113.
YOUNG PATCH OF RUTGERS, PLANTED 6 FEET X 2 FEET 6 INCHES.

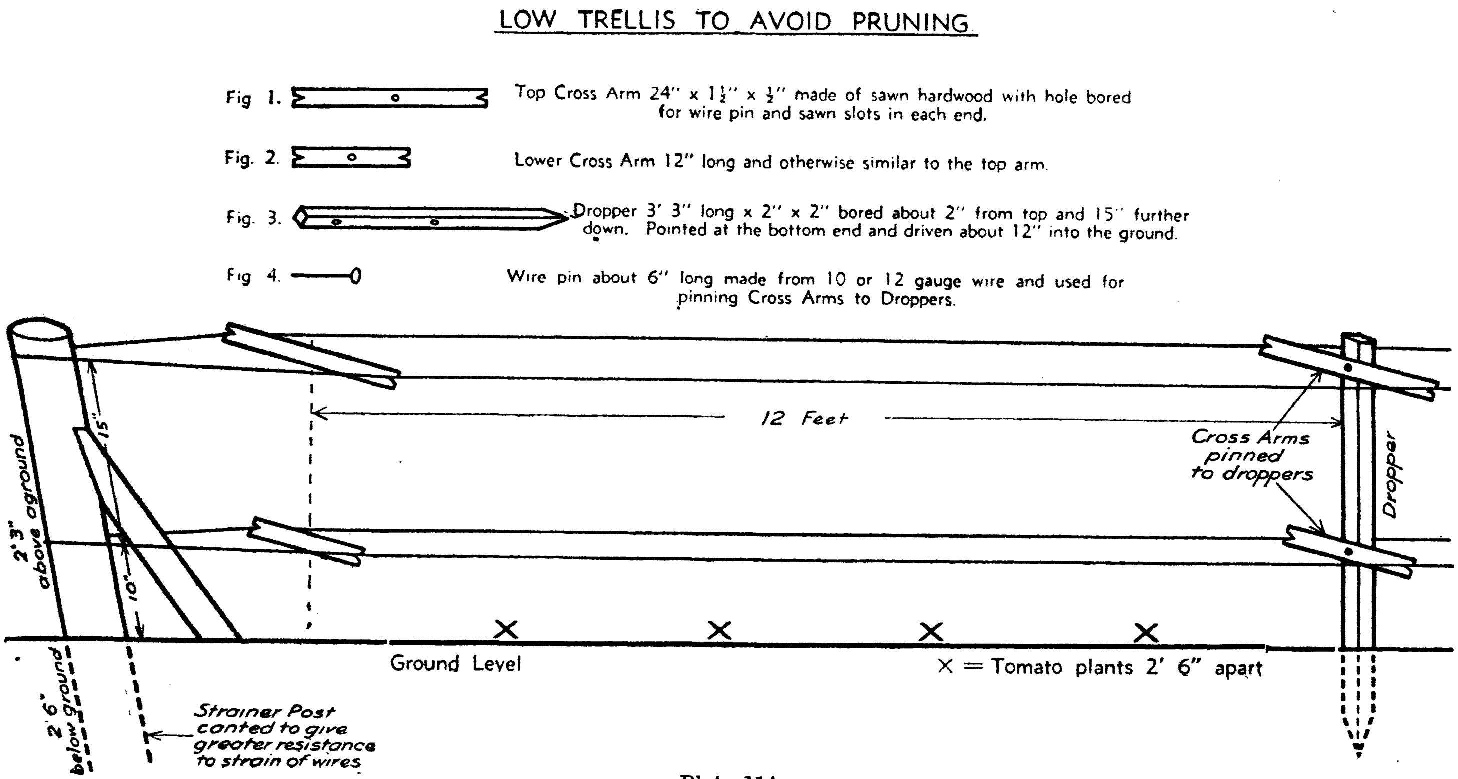

LOW TRELLIS TO AVOID PRUNING
Fig 1.
Top Cross Arm 24" x 1½" x ½" made of sawn hardwood with hole bored for wire pin and sawn slots in each end.
Fig. 2.
Lower Cross Arm 12" long and otherwise similar to the top arm.
Fig. 3.
Dropper 3' 3" long x 2" x 2" bored about 2" from top and 15" further down. Pointed at the bottom end and driven about 12" into the ground.
Fig 4.
Wire pin about 6" long made from 10 or 12 gauge wire and used for pinning Cross Arms to Droppers.
2' 3" above aground
15"
10"
2' 6" below ground
Strainer Post canted to give greater resistance to strain of wires
12 Feet
Cross Arms pinned to droppers
Dropper
Ground Level
X = Tomato plants 2' 6" apart

Plate 114.
DRAWING OF CRADLE.

Cradle.

This method of growing tomatoes was popular some years ago in the Redlands area, but is not used so extensively as formerly, and trellising is now much more widely practised. It is of advantage during the autumn months, particularly for the thick bushy types of tomatoes which are not easily adaptable to pruning, as it keeps the plants up off the ground; consequently, much fruit is saved which otherwise would be lost in a ground crop. It is not as difficult to apply dusts or sprays to cradled plants as to ground grown ones and they are much easier to harvest. No pruning is required. The method of construction is as follows.

Plate 115.

METHOD OF PLANTING AND TRAINING PLANTS ON CRADLE.

At each end of the cultivated field place short hardwood posts 2 feet 6 inches in the ground and 2 feet 3 inches high (4 feet 9 inches over all). These should be set at a slightly backward angle and be well stayed, to better stand the weight on the wires of the vines and fruit. Five feet is sufficient to allow between each row. Hardwood droppers (Plate 114, fig. 3) 3 feet 3 inches in length should be placed in line and driven into the ground every 12 feet so that the actual height is 2 feet 3 inches, thus corresponding with the strainers at each end. Each dropper should have two holes bored through it—one almost at the top, and the other about 15 inches below the first. These holes need be only of ordinary nail-bit size (No. 5), being big enough to carry a short wire pin made from No. 10 or 12 gauge galvanised or steel wire. The wire pins (Plate 114, fig. 4) carry the cross-arms. The top cross-arm (Plate 114, fig. 1) should be 2 feet by 1½ inches by ½-inch sawn hardwood with a centre pin-hole and a ½-inch sawn slot in each end. Two top wires are run from either side and very near the top of the strainers. Similarly, two wires are run from either side of the strainers at about 10 inches from the ground. The wires are strained tight, the cross-arms placed in position, and attached to each dropper with a wire pin, which is then bent over.

The plants are planted between the wires, spaced about 2 feet 6 inches to 3 feet apart (approximately 3,000 plants per acre). The first laterals are spread over the lower wires, and the later laterals over the top wires, and allowed to grow towards the ground again.

Trellising.

Trellising of winter and spring tomatoes is general throughout the Redlands area and this method has much to commend it. Although there is a lot of work involved in the early stages—such as putting up posts, wires, and strings, and then training the plants—there are other factors which balance this. The fruit is of better quality and it is easier to pick, dust, spray and irrigate. In comparison with those from ground crops at this period of the year, losses in trellised crops from blemishes and disease are cut to a minimum.

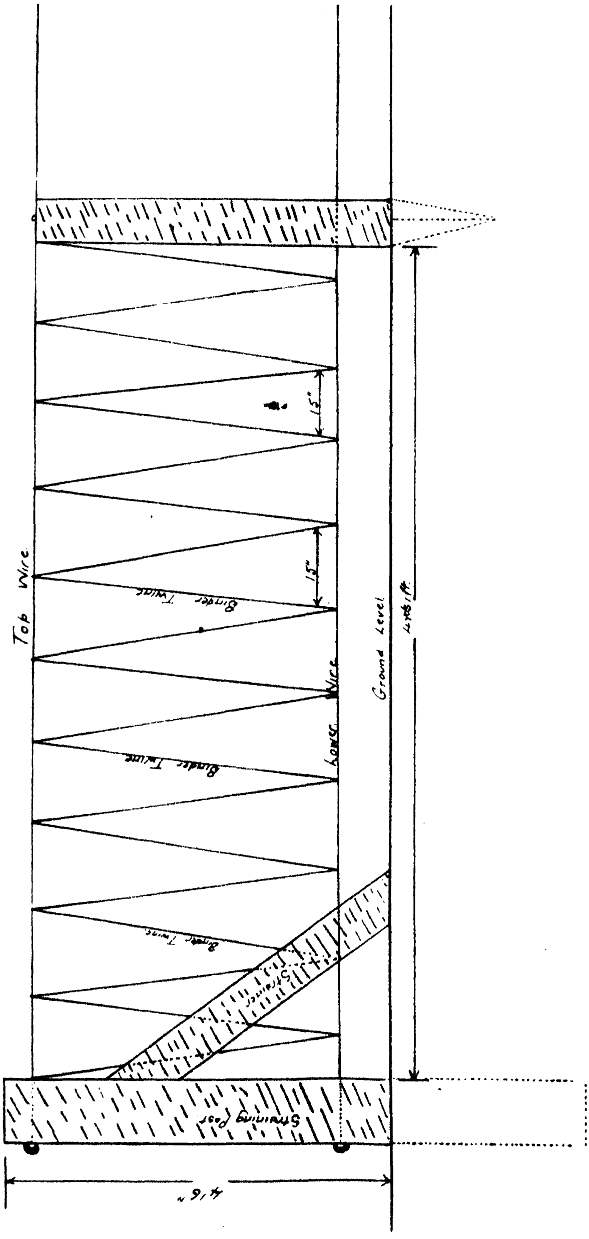


Plate 116.
METHOD OF CONSTRUCTING TRELLIS.

Many varieties of tomatoes are unsatisfactory in the winter because of faulty pollination, and Salads Special and others of this type, which usually crop well under winter conditions, are recommended. Because of their small fruit, these are most unsuitable as ground crops, but are most satisfactory for trellising, the pruning of all surplus growth ensuring fruit of good size.

Two methods of trellising are in common use. The first as shown in Plate 116 is constructed as follows. Two strong posts of about 7 inches diameter and 7 feet long are set firmly in the ground to a depth of 2 feet 6 inches at the ends of each row and firmly stayed. The rows are spaced 4 feet 6 inches apart. Between the posts, strong hardwood stakes are driven into the ground every 12 feet to act as intermediate supports; the end posts are bored at about 9 inches and 4 feet 6 inches above the ground level to carry two 12½ gauge wires. The wires are tightly strained and stapled. The trellis is then completed by tying the end of a ball of binder twine to the top wire and passing the ball down under the bottom wire and back over the top wire to form a "V" pattern, as shown in Plates 116 and 117. The bottoms of the "V" should be 15 inches apart, the distance the plants are in the rows.

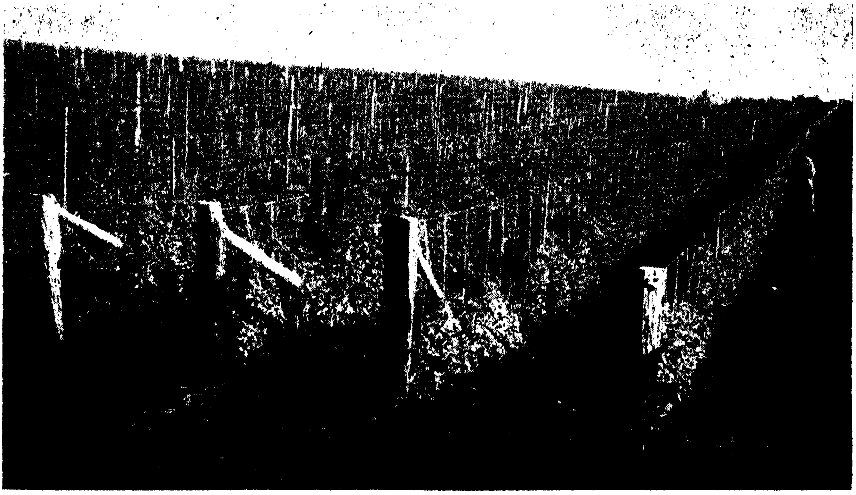


Plate 117.

SHOWING COMPLETED TRELLIS BY PASSING TWINE UNDER AND OVER WIRE.

The young plants are set out immediately under each "V" and the arms trained up each piece of twine. Some growers cut the twine to the required lengths and tie each end separately (Plate 118).

Both methods are quite satisfactory and as there are other methods which can be used it would be advisable for the grower to find out which is the more suitable to him.

Another satisfactory method of trellising which varies slightly from that described above is as follows. Holes are bored at the ends of the rows with an 8 inch soil auger to a depth of 3 feet at an angle of about

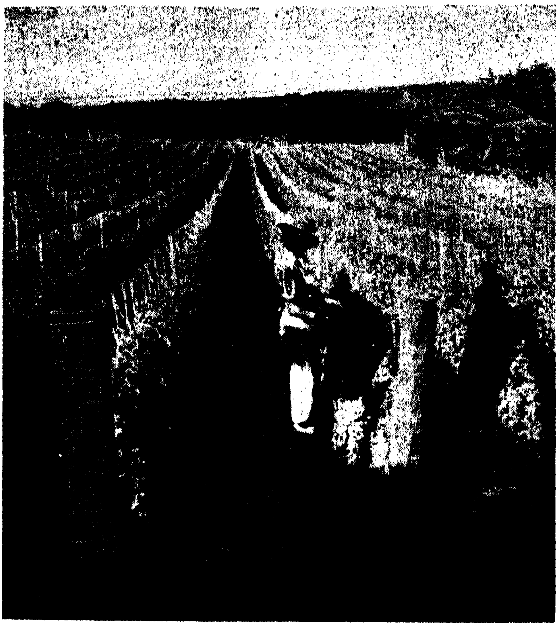


Plate 118.

SHOWING TRELLIS WHERE TWINE IS CUT TO REQUIRED LENGTHS AND TIED.

60 degrees (Plate 119) and a post of about 7 inch diameter and 8 feet long dropped into the hole. There is no need to stay these posts. The posts are bored at 4 feet 6 inches and 9 inch levels and 12½ gauge wire strained through them. The intermediate supports consist of a small post of about 4 inch to 5 inch diameter and 6 feet 6 inches long, set firmly into the ground every 22 yards to a depth of 2 feet. Between the posts are four hardwood droppers which are allowed to rest on the ground. The top wire is stapled to the tops of droppers and intermediate posts whilst the bottom wire is stapled to the sides. This is a good trellis, being very firm and strong. The method of putting on the twine is the same as described for the previous method of trellising. If the staples are not driven in too far they are easily removed at the end of the season and may be used again. A seven pound ball of twine will do approximately seven chains of trellis. Planting 15 inches apart in rows 4 feet 6 inches apart allows approximately 7,000 plants to the acre.

Staking.

Staking has been replaced by trellising in most districts, and growers who prefer the former method are few. Hardwood stakes about an inch square and 6 feet 6 inches to 7 feet long are driven into the ground to allow at least 5 feet above the ground level, from 15 inches to 18 inches apart in rows 4 feet 6 inches apart. One plant is placed at each stake and pruned to a single stem. The stem is tied to the stake every 12 to 15 inches by binder twine.

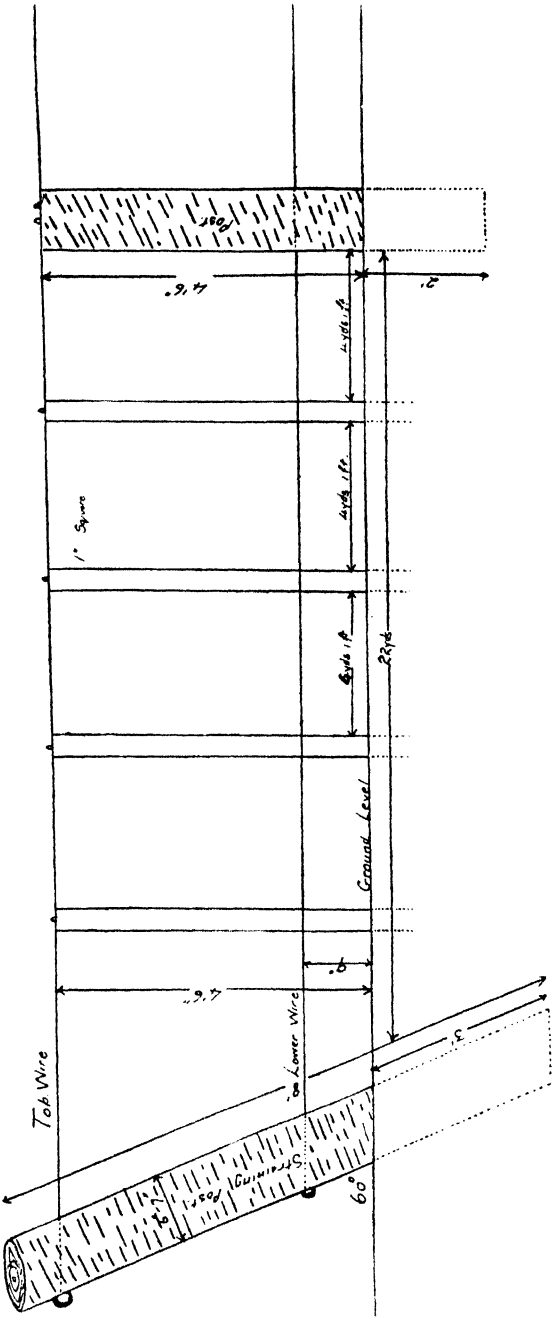


Plate 119.
SECOND METHOD OF CONSTRUCTING TRELLIS.

The ties are made loosely so that they do not cut the stem, and are placed under a leaf if possible, but this is not absolutely necessary. The method of tying is to pass the twine around the stem (see Plate 120) crossing it over and passing around the stake twice before knotting. An easy method of hammering the stakes is to use a piece of two inch pipe about 2 feet 6 inches long, with a plug in one end. The stake is placed in position, the pipe slipped over the top and by moving it up and down in pile driver fashion, it will rapidly drive in the stake.

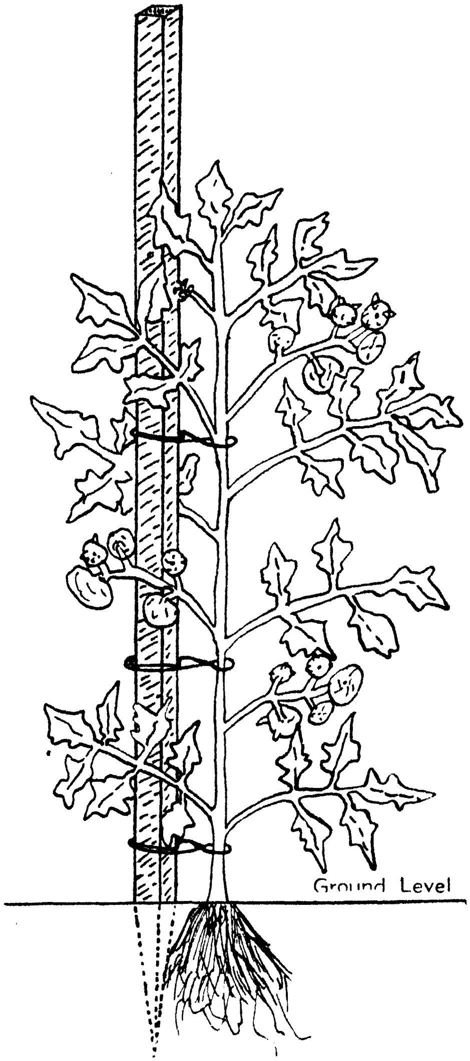


Plate 120.
SHOWING METHOD OF STAKING.

IRRIGATION.

Many tomato crops are grown without irrigation throughout Queensland during the autumn months and during the spring and summer months in the Stanthorpe district.

In the Redlands and metropolitan areas, however, where the soil dries out rapidly, it is rarely that a season is experienced where a crop can be grown to perfection without irrigation. There are two methods in use, namely furrow and overhead irrigation.

The former is used only on properties where the slope and type of the soil are suitable for lateral movement of the water. If the soil is very sandy or porous, it is almost impossible to supply enough water to reach the end of a row of reasonable length. If the slope is too steep, the water will run to the end of the furrow without penetrating sufficiently to wet the soil thoroughly. On the other hand, on land which is too flat the intake end of the furrow is overwatered long before the water reaches the distant end.

Plate 121.
FURROW IRRIGATION IN TRELLISED TOMATOES.

Plate 122.
FURROW IRRIGATION SHOWING USE OF HOSE ON IRRIGATION STANDARDS.

One great advantage of the furrow method is that it avoids excessive wetting of the plants with consequent increase in disease, or washing off of dusts or sprays, necessitating more frequent application of fungicides and pest destroyers.

Once the pipes are set up, overhead irrigation does not require the same amount of attention as does the furrow type, and also has the advantage of giving a more complete covering of the ground, thus ensuring a better root spread.

Plate 123.
OVERHEAD SPRAY IRRIGATION.

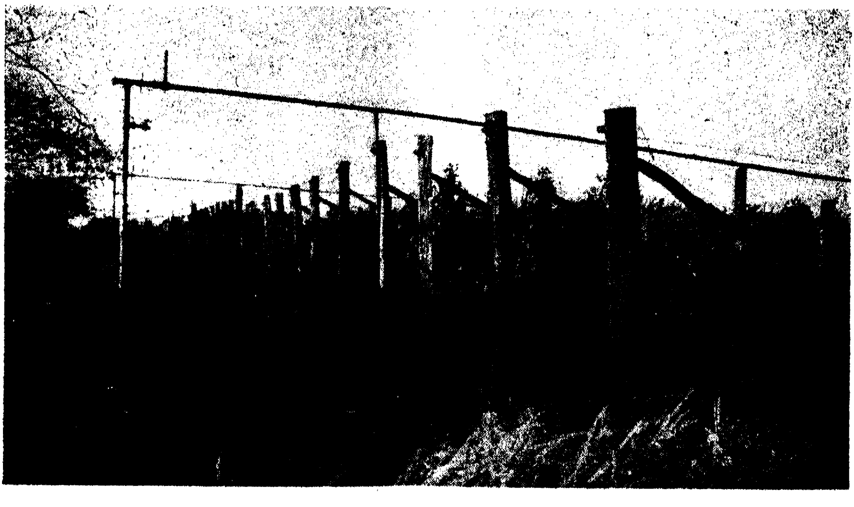


Plate 124.
SHOWING STANDARDS AND PIPE OF OVERHEAD IRRIGATION.—In many cases rubber hoses are used to connect overhead pipe to low standards.

It should be remembered that excessive watering by either method is distinctly harmful. When the first inch or two of surface soil appears dry, many growers immediately apply heavy irrigation, but, it should be remembered the tomato is a deep-rooted plant and draws much of its moisture requirements from six to nine inches below the surface. Examination of the position with respect to water should therefore be made several inches below the ground surface. Constant wetting of the ground, especially during winter months, is not conducive to good growth and heavy cropping.

CULTIVATION.

If the ground for the tomato crop has been well ploughed and thoroughly prepared, there is no need for deep cultivation at any stage during the growing period. It has been proved with most crops, including tomatoes, and on most types of soils, other than very sandy ones, that the only benefit derived from cultivation is the control of weeds. Therefore, shallow cultivation, if done when the weeds are small, will do all that is required and be much safer than deep cultivation. Deep cultivation, in most cases, injures the rooting system of the plant, particularly with trellised crops as there is always the temptation to cultivate as close to the plants as possible in order to save chipping. Ground crops are probably not so seriously affected, as the growth after a few weeks does not allow the scuffler to come in too close.

When top dressing, which is usually done with a water soluble fertilizer, many growers plough a deep furrow alongside the plant, fertilize this furrow, and then plough another furow over this so that this fertilizer is well covered with soil. This is not necessary, however, for the first rain, or irrigation, will dissolve the material and carry it down to the roots of the plant. If it is desired to mix the fertilizer with the soil, this should be done by light cultivation. The opening of a deep furrow alongside the plants, particularly when they are starting to set fruit, will probably do much more harm than can be compensated for by the addition of the fertilizer.

If growers wish to hill up the plants slightly they should do so as soon as the plants are big enough, which will be a few weeks after planting out.

"BUCK" PLANTS.

In quite a number of varieties of tomatoes, plants occur which are known as "buck" plants.

When young these plants are much sturdier than the others, and have short internodes, small leaves and numerous laterals. It has been recorded that they may have as many as 20 to 30 laterals with distorted flower clusters, even when only 6-8 inches in height. They do not crop satisfactorily and bear small numbers of misshapen fruit, almost unrecognisable as to variety. There has been no satisfactory explanation as to why the "buck" plants appear. Experienced growers soon learn to pick the "buck" plants from the good, even while they are still in the seed beds and only three to four inches high. When these "bucks" are noticed after planting out they should be removed immediately and replaced with a good plant. If allowed to remain, there is a chance that a grower, when saving his own seed, will include some of the fruit from them. It has been reported that varieties subject to "buck" plants may produce up to 20 per cent. of these, but such a high percentage has never been noticed in Queensland. One method of guarding against this trouble is to obtain seed from reliable sources only. Growers who have selected their seed carefully over a period of five or six crops have practically eliminated this nuisance.

The varieties grown in Queensland which show "buck" plants are Salads Special, Walker's Recruit, Planter's Favourite and Australian Dwarf Red.

SAVING SEED.

Many growers save their own seed from year to year. This practice is recommended, but it is necessary that certain precautions are taken to make sure that:—

1. The variety is true to type;
2. Plants are free from disease; and
3. Selection of individual plants is made in the field.

A number of plants should be selected and marketed early in the season and checked carefully throughout the life of the plant. They should be vigorous, and carry fruit typical of the variety, in good quantity and average size throughout the crop and be free from disease. If a tomato shows a good first hand only, and the remainder are not satisfactory, do not be tempted to choose the few good fruit. The plant should be rejected altogether as a source of seed.

Fruit for seed should be allowed to colour on the vines and become fully mature before being picked. Remember that as it is possible to improve a variety by careful selection so it is possible to lose it by choosing fruit indiscriminately!

A suitable method for the preparation of seed is as follows:—Take the fully ripened fruit, cut in halves and squeeze the pulp into a barrel or galvanized bucket. Place the receptacle under cover and allow the pulp to ferment for four to five days. Do not add water, as this will probably check fermentation and may even cause the seeds to shoot, which they will not do in their own juice. When fermented sufficiently, the pulp and seed may be put into a sieve and washed thoroughly under running water. This will clean the seed of all pulp. The seed should be spread out on clean hessian or bags and dried in the shade. After drying, the seed should be rubbed briskly to break the clumps, and then stored in suitable air-tight containers for future use. A half-bushel case of fruit will give approximately 1 ounce of seed.

THE COUNTRYMAN'S SESSION

Sunday Morning Radio Service to Farmers

(By arrangement with the Australian Broadcasting Commission)

Farmers are recommended to tune in to either a
Queensland National or Regional Station.

EVERY SUNDAY AT 9.30 a.m.

ANT PROTECTIO

Pests of the Peanut Crop.

J. HAROLD SMITH, Senior Entomologist.

SINCE the commencement of peanut growing on a commercial scale in Queensland, the activities of insect pests in the crop have, from time to time, attracted attention. Compared with some other cultivated crops in the more important agricultural districts, the toll taken by insects in peanuts is relatively light. Some species are, however, important pests which can cause considerable damage. They are pea mite, white grubs, brown scarab beetle, crown borer, corn ear worm, green vegetable bug and mealy bugs. Two minor pests are red shouldered leaf beetle and a small Scarabeid beetle.

PEA MITE OR BLUE OAT MITE.

A critical period in the life of a peanut crop occurs shortly after germination, for the rainfall may then be light and climatic checks to growth accentuate the effects of any injury caused by the pea mite or blue oat mite. This species is well known as a minor pest of cereals on the Darling Downs but, since 1942, it has also been recorded as attacking peanuts in the South Burnett district, where the crop is grown extensively. A general yellowing of the leaves is the earliest field symptom in affected plants followed, if the mites are numerous, by a slackening in the growth rate and by a shedding of the lower leaves. Should the attack last for several weeks, some of the young plants die and the final stand is uneven. The mites are easily disturbed, but, if the plants in an infested field are approached carefully and examined from a distance of one or two feet, small, blackish spots can be seen on the leaves. Each of these spots is a pea mite and large numbers sometimes occur on a single plant. At the commencement of an outbreak, the injury is more or less confined to small groups of plants, though later the pest spreads very rapidly throughout the field.

Life History and Habits.

The pea mite* has a very wide distribution both in Australia and overseas. The adults are approximately one-thirtieth of an inch in length, oval in shape, and blue in colour except for the legs, which are bright red. The mites lay their orange-red eggs on the upper surface of the leaves—usually singly, but sometimes in groups of three or four. The immature mites emerging from these eggs are very similar to the adults in appearance though much smaller in size. Like the adults, they feed mainly on the upper surface of the leaves and contribute to the overall damage produced by the pest. As a rule, the mites are seen most easily during the late afternoon when feeding takes place; earlier in the day, they shelter towards the base of the plant and few are visible on the leaves. Outbreaks of the pest usually occur during spring and early summer and are less serious when monsoonal rains stimulate rapid growth of the crop.

---

* *Penthaleus major* Duges.

Control.

In field practice, insecticides are seldom, if ever, employed for the control of the pea mite. Under some conditions, however, treatment may be desirable, for if the pest is checked at the right time a uniform stand of plants may be assured. Should treatment with an insecticide be considered necessary, good results can be expected from a dust containing 3 per cent. nicotine, which gives efficient control of a related species in the Southern States, known as the red-legged earth mite. Two applications of the insecticide at an interval of 10 days would probably prove effective in controlling the pest.

WHITE GRUBS.

Peanuts are grown extensively on friable, volcanic, red soils in which white grubs tend to be active and it is therefore not surprising that damage to the crop by these pests has been reported on a number of occasions in several parts of the State. Usually, the affected crops had been sown in newly broken-up grassland. In such cases, the pastures were already infested by the grubs and those insects which survived the tillage operations turned their attention to the cultivated peanut crop. Typically, the strike in such grub infested areas is satisfactory and growth proceeds normally for some weeks. Then at any time between November and February, plants collapse and die in patches here and there throughout the field. Examination shows that the tops of these plants have been severed from the roots by one or more white grubs feeding at a depth of from one to three inches beneath the surface of the soil. The end of the severed stem of a collapsed plant is swollen and this character is diagnostic even when the insects themselves cannot be located. White grub attacks tend to be local in their incidence and the same farm may be infested from year to year.

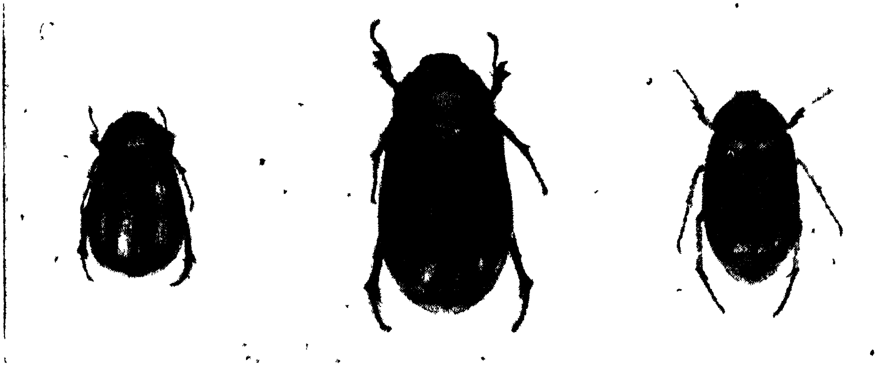


Plate 125.

SCARABAEID BEETLES.—The beetle on the right is *Rhopaea magnicornis* Blk., natural size.

Life History and Habits.

These white grubs are the immature stages of large, heavy-bodied, brown, scarabaeid beetles* (Plate 125), which frequently attract attention during their flight period between November and January. The species involved in white grub damage to peanuts varies from district to district, but the habits of all are similar. During the summer flight period, the beetles lay their relatively large, white eggs in the soil, where they hatch within three weeks. The small larvae emerging from them feed, to some extent, on the smaller roots of living plants. The damage caused by the young grubs is not important unless populations are abnormally high. Twelve months later, however the insects are in the final larval stage and they then feed voraciously on the roots of peanut and other plants. At this stage, the grubs measure from one and a-half to two inches in length and are curled in shape; the hind segments, which are much darker than the rest of the body, are somewhat distended. Larval development is completed in approximately sixteen months and the insects then burrow deep into the soil and pupate in earthen cells. Beetle emergence does not occur until early summer, usually after the onset of storm rains.

Control.

White grub pests with a two-year life cycle are seldom troublesome in permanent cultivation paddocks planted to annual crops such as maize, grain sorghum or peanuts each year. This is primarily due to the fact that little egg-laying takes place in fallow land or land carrying very young plants when the beetle flights are in progress. Consequently, should previous experience or the proximity of a farm to infested areas suggest that white grubs may be a problem, the grower may lessen the risk of attack by planting the peanut crop on land which has been under cultivation for at least one, and preferably two or more years. If Rhodes grass is a constituent part of the farm rotation, the peanut crop would automatically precede the establishment of the pasture. These cultural recommendations for white grub control, however, should not be practised in areas free from the pest; normally peanuts grown in newly broken up grassland yield good crops.

BROWN SCARAB BEETLE.

The brown scarab beetle is related to the species implicated in white grub damage to peanut crops but, unlike them, it is injurious only in the adult stage. Outbreaks of this pest are seldom extensive but plants in limited areas may be destroyed by the beetles feeding two or three inches below ground level and severing the tops of the plants from their roots. The attacked plants die and may be removed easily from the soil. One or more beetles can usually be found among the roots of each plant if a search is made for them as soon as the damage is observed in the field.

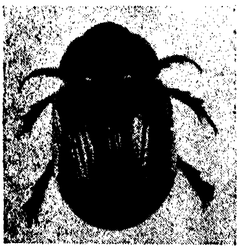


Plate 126.

Brown Scarab Beetle × 2.

---

* *Rhopaea magnicornis* Blk. is an important species in Southern Queensland.

Life History and Habits.

This thick-bodied, brown beetle* (Plate 126), which measures about ¾ inch in length, is a minor pest of many cultivated crops. Like some other insects in the group to which it belongs, its legs possess horny projections that facilitate the movement of the beetle in the soil. The larval stages of the brown scarab beetle are of the white grub type, and occur in soils rich in organic matter as well as in compost heaps; they have not been recorded as injurious to living plants.

Control.

Insecticides are usually of little value for the control of such pests as the brown scarab beetle in field crops. Moreover, they would be essentially protective and their use could be justified only if outbreaks occurred each year in the same district and the probable losses warranted considerable expenditure on control measures.

CROWN BORER.

Crown borers occasionally cause serious damage in peanut crops, for infested plants in the field wilt and die in the later stages of their development. When these plants are examined, it is found that the interior of the crown has been completely hollowed out by beetle larvae, which measure from one-half to one inch in length. A single larva is sufficiently destructive to kill an infested plant, but two or even three may be present in the same crown. The tunnels occupied by the larvae extend for some distance into the root, and the damage is such that nutrients cannot flow from leaves to roots and vice versa.

Life History and Habits.

The identity of the insect or insects responsible for crown borer damage to peanuts is uncertain because the larvæ tunnelling in the plants have not been bred to maturity. The appearance of the immature stages of the insects suggests, however, that they belong to one or other of two longicorn beetles† associated with leguminous crops. These beetles have rather similar habits and the lucerne crown borer may be cited as a representative species. The adult stage of this insect measures approximately five-eighths of an inch in length and has light-orange wing-covers ornamented with black spots which occasionally merge into transverse bands. The eggs are presumably laid in the lower part of the stem, for the young larvae are usually found in the above-ground portion of the plants. These larvae feed in the pith of the stem and burrow downwards into the crown and roots. When full-grown they are elongate in shape, white in colour, and characteristically constricted between the body segments. The head is wider than the body, this being a normal character of the group to which they belong. Pupation takes place in the larval tunnels usually at or below ground level, and the adult beetles later escape from the pupae. The length of the life cycle has not been determined but probably extends over a period of from three to four months.

---

* *Isodon puncticollis* Macl.

† The suspected insects are *Zygrita diva* Thomps., the lucerne crown borer, and *Sybra centurio* Pasc.

Control.

The control of stem borers in peanuts cannot be achieved by the use of insecticides and the only practicable method of reducing infestation is to effectively destroy crop residues after harvesting. These may be burned, a procedure which kills any larvae and pupae contained within the root or crown of the plants.

CORN EAR WORM.

Leaf-eating caterpillars are often present in peanut fields and the damage caused by them is, at times, readily observable because they feed on the foliage which, as a consequence, becomes very ragged in appearance. The injured plants are infested with pale-green, greenish-brown, or dark-brown caterpillars, two or three of which may be seen on the leaves of each infested plant, but more particularly on the younger leaves near the growing point. Sometimes the insects burrow into the tip of the plant, thus causing the growing point to collapse, and the caterpillars also injure the stem and flowers. Attacks usually occur when the crop is eight to ten weeks old and the first-formed nuts are filling. Were such attacks to continue for any length of time, the crop wastage would be serious. Fortunately, however, they seldom last for more than three weeks and, if growing conditions are good, infested crops make a quick recovery, though the nuts may fill out rather slowly. Frequently the damage is restricted to those parts of a field in which plant growth is most vigorous.

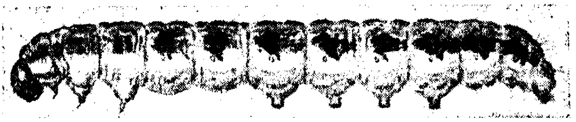


Plate 127. [*Drawing by William Manley.*

CORN EAR WORM × 2.

Life History and Habits.

The corn ear worm*, a cosmopolitan pest which feeds on a wide range of both cultivated and wild plants, is the most important caterpillar pest of peanuts. The parent moths measure about one and a half inches across the outstretched forewings, which are greenish-gray in colour and often tinged with red. The hind wings are creamy-yellow with a smoke-coloured outer margin. The globular, creamy-white eggs, which are about half the size of a pin-head, are laid by the moths singly on the foliage of the peanut plants and from them small, whitish larvae later emerge to feed on the leaves. Growth proceeds through a series of moults and, in the later stages of development, the larval colour varies from pale-green to dark-brown with green, yellow, brown, and black markings. The full-grown larvæ (Plate 127) are approximately one and a half inches in length when they leave the plant and enter the soil to pupate in earthen cells at depths of from one to three inches.

---

* *Heliothis armigera* Hb.

Transformation from the pupal to the adult stage takes place inside the earthen cells from which the moths later force their way above ground. The whole life cycle may extend over four weeks in the summer months and there are usually five generations during the year.

The moths are attracted strongly to tasselling maize, and to some other crops such as lucerne and cotton, all of the three host plants mentioned being preferred to peanuts. The presence of these crops in the immediate vicinity may therefore create local conditions favourable for an attack on the peanut crop.

Control.

Outbreaks of corn ear worm and other leaf-eating caterpillars in peanuts seldom, if ever, require the use of insecticides for their control. Attention, however, should be paid to cultural measures which can be expected to keep their numbers at a low level. Weeds, such as the pig weeds and bull head, on which these insects breed, should be suppressed in cultivated areas by the regular use of implements. Furthermore, within the limits imposed by the farm rotation, peanut crops should be planted at the greatest possible distance from the preferred hosts mentioned above. The latter practice is particularly desirable if a spring crop of maize is sown on the farm, for the presence of this crop very often determines corn ear worm abundance in January and February, i.e., when the peanuts are growing freely.

GREEN VEGETABLE BUG.

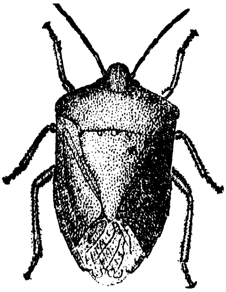


Plate 128.
GREEN VEGETABLE BUG × 2.
[Drawing by Wm. Manley.

The green vegetable bug, which is a common pest of market gardens, occasionally invades peanut crops in large numbers. Though the bugs feed on peanuts in both the adult and immature stages the damage caused by them is not great, even in the more spectacular outbreaks. They are readily seen, particularly when mating pairs are numerous and the vividly coloured immature bugs are clustered together on the leaves. The injury to the plants caused by this pest includes the collapse of terminals following feeding on the upper part of the stem. Such injury stimulates the development of axillary buds and the subsequent growth of the plants is somewhat bunched. Infested crops seldom react seriously to the pest and yields have apparently not been adversely affected in the outbreaks so far recorded.

Life History and Habits.

The green vegetable bug* (Plate 128) is an introduced insect which is now established in most parts of the State. The adult bugs are approximately one-half of an inch in length, shield-shaped, and pale-green in colour. Though capable of flight they do not readily take to the wing, and therefore can be caught easily by hand. Their barrel-shaped eggs are laid in masses on the under surface of the leaves and are at first white in colour but they turn pink shortly before the young bugs emerge from them. The newly hatched bugs are blackish in colour and usually remain in the vicinity of the egg masses for a few days before dispersing over their host plants. They moult several times as growth proceeds, each succeeding immature stage being larger and somewhat lighter in colour than the one preceding it, until they finally reach the pale-green, winged, adult stage. Several generations may be completed during the year and the adults over-winter in sheltered situations on the farms and in adjacent timbered country. Outbreaks of the green vegetable bug occur at infrequent intervals but they may last for several months. In peanut crops, the pest has, so far, attracted attention only when district-wide outbreaks were at their peak.

---

* *Nezara viridula* L.

Control.

Control measures for the green vegetable bug have not been required in peanut crops, because the injury inflicted by the pest in these crops has always proved less important than the threat implied by the presence of high green vegetable bug populations in the field. This may be due, in part, to the activity of an egg parasite* which was introduced some years ago to help combat the green vegetable bug. However, should the use of insecticides be considered necessary, a D.D.T. spray, used at a strength of 0·2 per cent, should give good control if it is applied when plant injury is apparent and the inward migration to the crop has been completed.

MEALY BUGS.

Mealy bugs are seldom important pests in the deep, red loams normally used for peanut growing, but plants at the lower end of poorly drained slopes may show characteristic symptoms of infestation. The infested plants are stunted and make little response to summer rains. Dense colonies of these small, meal-covered insects will be found on the underground portion of such plants, but occasionally the mealy bugs penetrate above ground and cluster round the base of the stalk. They are particularly numerous on the nuts, which often collapse and assume a blackish colour when the mealy bugs are present in large numbers.

Life History and Habits.

Colonies of the mealy bugs† infesting the roots and stems of peanut plants include all stages of the insect, full-grown specimens of which are about one-tenth of an inch in length and are covered with a flour-like, mealy substance. The body is fringed with waxy filaments, those at the hind end of the body being very long. Though capable of movement, they rarely change their position unless compelled to do so by the drying-out of their host plants. The young stages of the mealy bug found on peanut plants are generally referred to as crawlers because they move about freely and are primarily responsible for the establishment of new colonies on the same or adjacent plants. These crawlers are similar in appearance to the adults but are much smaller. The reproductive capacity of mealy bugs is high and under suitable conditions—chiefly a moist environment and an adequate supply of food—populations increase very rapidly. All stages of this insect feed through sucking mouth parts and the resultant loss of sap, when the mealy bugs are present in considerable numbers, impoverishes the attacked plants and causes the stunting which is sometimes observed in the field.

---

* *Microphanurus basalis* Woll.

† *Pseudococcus* sp.

Control.

Outbreaks of mealy bugs tend to be most severe in ant-infested land because some ants feed on mealy bug secretions and aid the establishment of new colonies by carrying the crawlers from one plant to another. These ants are more numerous near buildings and on soils fringing rivers and creeks than in the undulating country on which peanuts are generally grown. The exercise of care in selecting land for peanuts can therefore lessen the risk of damage by mealy bugs, for crops planted on well-drained, gentle slopes should escape infestation.

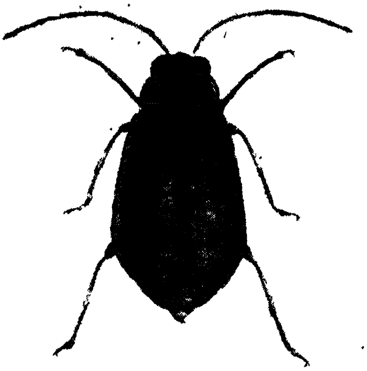


Plate 129.
RED-SHOULDERED LEAF BEETLE × 7.
[*Drawing by Hubert Jarvis.*

MINOR PESTS.

Two other pests sometimes injure peanut crops, but the damage inflicted by them is seldom of economic importance, even though the defoliation for which they are responsible may be appreciable.

The first of these minor pests is the red shouldered leaf beetle* (Plate 129), a small insect which measures three-sixteenths of an inch in length and is light-yellow in colour with a reddish band across the base of the wing-covers. Occasionally, dense swarms of this insect suddenly invade a crop and settle in it in restricted areas where they feed on the foliage. The effect of such an attack may be spectacular, for the leaves have a scorched appearance and indeed many of them may have been destroyed by the beetles. Should it be necessary to combat these swarms, they may be dispersed by applications of a nicotine dust; when so dispersed, the overall damage to the crop is of no consequence.

---

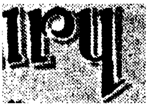
* *Monolepta rosea* Blk.

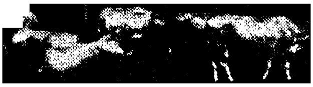
The second minor pest produces effects similar to those associated with red shouldered leaf beetle infestation but the swarming habit in this case is less characteristic and foliage injury is more evenly distributed throughout the field. The species is a small scarabeid beetle*, measuring about one-quarter of an inch in length, which is uniformly brown in colour and somewhat oval in shape. Large numbers of this beetle may be seen on the wing in some parts of the State between November and January. The injury for which they are responsible is seldom sufficiently serious to warrant the application of control measures.

---

* *Heteronyx brevicollis* Blk.

Plate 130.
ON THE EUNGELLA RANGE ROAD, NORTH QUEENSLAND.





Percentage of Butterfat in Cream.

C. R. TUMMON.

QUEENSLAND dairy legislation specifically requires that farmers' cream received at butter factories shall contain not less than 38 per cent. butterfat in summer months nor less than 34 per cent. during the winter months.

Questions asked frequently by farmers are "Why is it desirable to supply cream with a butterfat content above these margins; and why should it be lower in winter than in summer?"

In answering these questions, the following factors must be considered:—

1. Economic aspect.
2. Churnability of cream.
3. Keeping quality of cream.

Economic Aspect.

As the cartage paid by farmers for the transport of cream from farm to factory is on a gallonage basis, it will readily be seen how a saving is made by supplying cream of a high fat percentage over that of a low percentage, when a greater quantity of cream would be forwarded. Another possible saving factor is that fewer cream cans need be used. This can be quite important as the initial cost of cans of suitable type is considerable and through constant use and rough handling, the cost of maintenance—repairs and retinning—may also amount to a surprising figure if taken over a number of years.

Churnability of Cream.

There are nine commonly recognised fats in butterfat with varying melting points. These fats are:—

Olein Palmitin Stearin Myristin	glycerides of insoluble and non-volatile fatty acids.
Butyrin **Caproin** **Caprylin** **Caprin** **Laurin**	**glycerides of soluble and volatile fatty acids.**

Certain factors influence the relative proportions of fats present; for instance, the foods eaten by milking cows.

In summer when the heavy rainfall is a usual experience in Queensland dairy districts, there is a prolific growth of soft, succulent pasture available for cows, which produces a greater proportion of softer fats than the winter months. During the winter, the feed is usually of a hard, dry nature and hand feeding is to some extent practised. All this has a tendency to produce a preponderance of harder fats. The "churnability" of cream, which means the ability to convert the cream into butter during the process of churning, is affected by the relative proportion of high to low melting point fats in the cream to be churned. The experienced buttermaker has to make certain variations in manufacture—such as in cooling temperature of water and time taken to churn—for cream during different times of the year. This is the reason why a lower fat per cent. is allowable in winter than in summer.

Moreover, this standard of fat percentage has been set down after thorough investigation by laboratory methods, and expert practical buttermakers have proved that the least losses in fat in butter manufacture occur if cream of the desired fat percentage is delivered. Rich cream churns easier than low testing cream, with less buttermilk and consequently less loss of butter.

Another advantage is that standardization of cream to a percentage of approximately 34 per cent. butterfat may be achieved. This process of standardization becomes easier if there is little variation in fat percentage of cream. The actual standardization of cream is very desirable if a factory hopes to turn out a uniform quality and textured butter throughout the year.

Keeping Quality of Cream.

It may sound rather far fetched at first to say that cream of a high fat percentage should keep better than cream of a low fat percentage. However, such is the case and it is attributable to several causes. Firstly, bacterial development is more rapid in the constituents of milk other than fat, than it is in the actual fat itself. Secondly, when cream is separated at a low test, usually an undesirable amount of skim milk finds its way through the cream spout into the cream can. This, of course, greatly accelerates the bacterial growth by providing a more suitable medium for them. There are certain types of organisms which do thrive best in cream and are sometimes the cause of the development of a rancid flavour, but provided dairy methods are reasonably sound it may be confidently expected to produce a better keeping quality cream with a 40 per cent. test than with a 30 per cent. test.

One might ask: Why not therefore produce cream of a very much higher test than the minimum standard? This may be explained by the fact that certain fat losses in churning occur if cream of a very high fat percentage is churned through rapid break of the butter, and the method of estimating the amount of commercial butter which could be made from a farmer's cream would be more prone to error, and as a result of this slight inaccuracy the farmer's return would be slightly underestimated and he would be a loser. It may be easily seen then that it is equally necessary not to supply cream of a very high fat percentage (nothing over 47 per cent.) as it is not to supply cream below the butterfat standard.

The farmer may alter his cream screw to bring about the correct tests for winter and summer months.

There are many causes of variations in cream tests, some of which are within the power of the farmer to control, and some of which are not, such as changes brought about by the animals themselves.

Device for Inspecting Milk Tubes.

S. A. CLAYTON, Dairy Officer.

ON dairy farms on which milking machines are used particular care is necessary to ensure that the machines are kept in the cleanest possible condition. One of the worst sources of bacterial infection of milk will be found in the rubber tube which connects the claw to the metal milk line.

Some dairymen, apparently afraid of scoring the inner surface of the tube, make a practice of merely washing these tubes. Others use the familiar brush, which, it must be admitted, may score the rubber surface if the wire end of the brush is sharp.

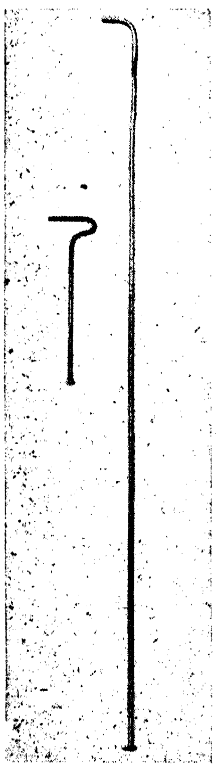


Plate 131.
CLEAVERS FOR MILK TUBES.

A cleaver (Plate 131) for these tubes, made by the writer, has proved very efficient in use. An old metal cream stirring rod was dismantled and the large stirring disc replaced with a smaller disc or washer of such a diameter that it would fit with moderate tightness into a milk tube. The shaft was long enough to enable the disc to be forced through the full length of each tube and withdrawn in the reverse direction. If the edges of the disc are approximately sized without being sharp or rough, there is no danger of injuring the rubber and the cleaning action is most effective.

In recent series of trials with this device it was found that even the most conscientiously cleaned machines may be found to have dirty milk tubes. Half the number of machines so far tested have been found faulty in this respect. In some cases thick curd has been removed from the tube, while in other cases where soda has been used as a cleaner a brown granulated paste was found adhering to the inside of the tube.

The device described is so simple and cheap to make and performs such valuable service that it would be worthwhile for every dairy farmer who uses a milking machine to have one. There is no reason why a similar tool of smaller size should not be made for cleaning and inspecting the smaller tubes which connect the teat cups to the claw.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which qualified for entry into the Advanced Register of the Herd Books of the A.I.S., Jersey, Guernsey, and Ayrshire Societies, production records for which have been compiled during the month of April, 1946. (273 days unless otherwise stated.)

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	AUSTRALIAN ILLAWARRA SHORTHORN.			
	MATURE COW (STANDARD, 350 LB.).			
Glenroy Judy	H. L. and C. I. Bruggemann, Kulpi	11,959·7	462·639	Parkview Glider
Boah Peak Pet 3rd	H. L. and C. I. Bruggemann, Kulpi	11,881·15	424·556	Glenroy Admiral
Navillus Nancy	E. W. Jackson, Nobby	10,326·5	403·390	Westbrook Midget Sheik
Springleigh Pearl 3rd	H. F. Moller, Boonah	8,865·6	362·585	Burradale Ronald
Alfa Vale Beauty 3rd	H. G. Watson, Killarney	9,786·7	359·726	Alfa Vale Peter
	SENIOR, 4 YEARS (STANDARD, 330 LB.).			
Springleigh Buttercup 18th	H. F. Moller, Boonah	9,184·6	394·464	Springleigh Robin
Aurora Fortune	H. L. and C. I. Bruggemann, Kulpi	8,892·65	370·253	Blacklands Maidor
	JUNIOR, 4 YEARS (STANDARD, 310 LB.).			
Penrhos Bounce 2nd	Sullivan Bros., Pittsworth	8,780·43	344·428	Penhros Sovereign
	SENIOR, 3 YEARS (STANDARD, 290 LB.).			
Euroa Marion 11th	P. R. Emery, Dallarnil	10,418·45	368·765	Dnalwon Sceptre
Rhodesview Lincoln 4th	W. Gierke, Helidon	8,705·85	343·601	Fairvale Major
Mount Camp Thelma 32nd	Madge Bros., Southbrook	8,529·35	341·453	Trevor Hill Reflection
	JUNIOR, 3 YEARS (STANDARD, 270 LB.).			
Ennismore Rose	E. W. Jackson, Nobby	8,193·5	337·871	Navillus Prince Henry
Rhodesview Nancy 49th	W. Gierke and Sons, Helidon	8,715·75	330·087	Fairvale Major
Sunlit Farm Amy 6th	W. H. Sanderson, Mulgeldie	8,693·8	318·057	Sunlit Farm Spider's Emblem
Trevor Hill Lola 2nd	G. Gwynne, Umbiram	7,882·54	310·382	Alfa Vale Reflex
Valera Roseleaf 13th	Sullivan Bros., Pittsworth	6,171·78	274·315	Alfa Vale Pride 2nd
	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Rhodesview Kitty 23rd	W. Gierke and Sons, Helidon	9,332·4	379·451	Fairvale Major
Corunna Oliva	A. H. Webster, Helidon	7,393·5	309·370	Corunna Supreme
Sunnyview Bess 15th	A. Lohse, Degilbo	7,267·2	305·254	Sunnyview Kitchener
Sunnyview Miss Mona	A. Lohse, Degilbo	6,823·8	253·747	Sunnyview Envoy

PRODUCTION RECORDING.—continued.

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
JUNIOR, 2 YEARS (STANDARD, 230 LB.).				
Bingleigh Rosette 2nd	J. C. Meier, Grandchester	8,380·08	376·426	Blacklands Jean's Victory
Valera Roseleaf 16th	Sullivan Bros., Pittsworth	8,270·18	324·989	Alfa Vale Pride 2nd
Valera Roseleaf 15th	Sullivan Bros., Pittsworth	6,744·86	292·088	Alfa Vale Pride 2nd
Rhodesview Nancy 56th	W. Gierke and Sons, Helidon	6,744·2	289·525	Alfa Vale Nigel
Applegarth Roan Calm	R. A. Shelton, Monto	7,232·05	281·513	Applegarth Paramount
Sunlit Farm Flower 4th	W. H. Sanderson, Mulgeldie	7,069·45	274·426	Sunlit Farm King Billy
Alfa Vale Judy 17th	V. R. Nugent, Murgon	6,760·25	261·706	Alfa Vale Pat
Sunlit Farm Ida 6th	W. H. Sanderson, Mulgeldie	6,477·55	242·582	Sunlit Farm King Billy
JERSEY.				
MATURE COW (STANDARD, 350 LB.).				
Westwood Goldilocks	F. Porter, Maleny	9,597·85	593·299	Hunstrete Emperor's Volunteer
Kathleigh Royal Mayflower	F. W. Kath, Dalby	9,446·4	509·944	Retford Royal Atavist
Strathdean Fay	S. H. Caldwell, Bell	8,202·93	484·611	Navua Ladora's Ruler
Westwood Lily	F. Porter, Maleny	9,902·8	482·053	Hunstrete Emperor's Volunteer
Westwood Silverleda	F. Porter, Maleny	8,439·2	467·890	Stretton Carnation's Volunteer
Rush Princess (imp.)	Estate J. Sinnamon, Moggill	8,656·15	466·421	Rush Fern Oxford Junior
Westwood Sunshine	F. Porter, Maleny	7,194·5	439·591	Stretton Carnation's Volunteer
Sunny Glen Princess	J. S. McCarthy, Greenmount	7,424·0	427·165	Brasseldale Duke
Westbrook Sylvia 5th	Farm Home for Boys, Westbrook	7,572·0	396·648	Oxford Aster's Lad
Hamilton Retford's Hope	J. Wilton, Killarney	8,239·3	387·243	Retford May's Victor
Trecarne Dairymaid 4th	T. A. Petherick, Lockyer	7,053·8	353·711	Jerseylea Golden Duke
SENIOR, 4 YEARS (STANDARD, 330 LB.).				
Trinity Cute Princess	J. Sinnamon and Sons, Moggill	10,362·19	546·645	Samares Cute Prince 3rd (imp.)
Trinity Mariette's Sunbeam	J. Sinnamon and Sons, Moggill	7,595·55	367·635	Samares Cute Prince 3rd (imp.)
Westwood Heather	F. Porter, Maleny	5,730·6	333·659	Westwood Palatine Volunteer
JUNIOR, 4 YEARS (STANDARD, 310 LB.).				
Strathdean Gem	S. H. Caldwell, Bell	10,716·87	619·380	Strathdean Xenia's Lad
Brooklands Cunning Drop	W. S. Conochie, Sherwood	10,888·8	529·331	Englorie Cunning Victor
Strathdean Marvelette	S. H. Caldwell, Bell	7,860·1	512·767	Navua Ladora's Ruler
SENIOR, 3 YEARS (STANDARD, 290 LB.).				
Westwood Silverbell	F. Porter, Maleny	8,337·4	511·551	Westwood Brown Victor
Trinity Crowning Duchess	J. Sinnamon and Sons, Moggill	8,803·5	463·554	Trinity Crowning Effort
Glenview Royal Hawthorn	C. A. Edwards, Alderley	7,043·06	365·366	Trinity Royal Prince
Gem Maudette	C. A. Edwards, Alderley	6,352·75	314·362	Bulby Oxford Gamboge

JUNIOR, 3 YEARS (STANDARD, 270 LB.).

Hocknell Bravo Girl	N. C. Webb, Beaudesert	8.962·1	437·087	Navua Victoire Lad
Trinity Graceful Lady	J. Sinnamon and Sons, Moggill	8,897·0	433·281	Trinity Crowning Effort
Windsor Lady Gladys	Johnson Bros., Gleneagle	8,554·45	418·748	Brookland Sultan's Victory
Westwood Peggy	F. Porter, Maleny	6.955·75	409·919	Westwood Palatine Volunteer
Trinity Princess Royal 2nd	J. Sinnamon and Sons, Moggill	6,884·18	402·657	Trinity Crowning Effort
Trinity Princess Rose	J. Sinnamon and Sons, Moggill	6,641·32	368·272	Trinity Lily's Lad

JERSEY.

SENIOR, 2 YEARS (STANDARD, 250 LB.).

Trecarne Jersey Hope 2nd	J. J. Ahern, Conondale	7,538·75	416·752	Trecarne Some Duke
Lermont Marie	J. Schull and Sons, Oakey	6,789·6	342·659	Selsey Samares Hallmark
Lermont Joyful 2nd	J. Schull and Sons, Oakey	5,162·55	306·363	Selsey Samares Hallmark
Strathdean Dolly	S. H. Caldwell, Bell	5,024·87	272·926	Navua Ladora's Ruler

JUNIOR, 2 YEARS (STANDARD, 230 LB.).

Lermont Kitty 2nd	J. J. Ahern, Conondale	6,941·1	384·310	Selsey Samares Hallmark
Glenview Xenia's Watfern (258 days)	F. H. Sippel, Murgon	8,354·75	359·369	Trinity Governor's Hope
Mayfair Ettie 3rd	J. W. Carpenter, junr., Helidon	5,556·5	300·830	Trecarne Golden King 2nd
Trinity Diamond Wedding	J. Sinnamon and Sons, Moggill	5,242·16	281·7	Trinity Crowning Effort
Trinity Effort's Royal	J. Sinnamon and Sons, Moggill	5,497·06	275·913	Trinity Crowning Effort
Austral Park New Princess	A. Semgreen, Coolabunia	5,375·55	271·780	Austral Park Nice Lad
Glenview Princess Superior	F. H. Sippel, Murgon	6.591·9	265·117	Trinity Royal Prince
Pinegrove Bluebelle's Pride	J. W. Evans, Rosewood	4,431·04	264·686	Glenview Victor
Trecarne Pealing 4th	C. Huey, Sabine	5,341·5	262·027	Trecarne Some Duke

GUERNSEY.

SENIOR, 2 YEARS (STANDARD, 250 LB.).

Willowbrae Mate	A. S. Cooke, Maleny	5,543·25	261·591	Linwood Peace Boy

JUNIOR, 2 YEARS (STANDARD, 230 LB.).

Willowbrae Marygold	A. S. Cooke, Maleny	6,697·5	320·833	Linwood Peace Boy

AYRSHIRE.

SENIOR, 4 YEARS (STANDARD, 330 LB.).

Myola Miss Jean	J. R. Ruhle, Motley	7,958·12	375·363	Myola Bosca

SENIOR, 3 YEARS (STANDARD, 290 LB.).

Leafmore Bonnie Lass 2nd	J. P. Ruhle, Motley	8,013·07	354·308	Myola Bessemer

Practical Duck-keeping

By J. J. McLACHLAN, Poultry Adviser.

IN Queensland, ducks are chiefly kept for table purposes, although some small flocks are kept for egg production. There are, however, few specialized duck farms. The market for table birds is usually fairly well supplied, but high values are not regular, though always firm for the Christmas trade.

A duck egg is equal to a hen egg in food value, and, provided the birds are given good wholesome food and kept under strict sanitary conditions, it would be difficult to distinguish any difference in general quality. Some breeds are more prolific layers, have a longer profitable life, usually more easily reared, and freer from disease than other poultry.

BREEDS.

The foremost breed is the Muscovy which is essentially a table bird The Muscovy is distinct from all other breeds of ducks and will always remain distinct, for if this breed is crossed with any other breed the progeny will be "mule" ducks. Other heavy or table breeds are Pekin, Rouen and Aylesbury. Light or laying breeds comprise mainly of Indian Runners and Khaki-Campbell.

THE MUSCOVY.

General Characteristics.

Head: Rather long; in drake, large the top covered with long crest-like feathers, which are elevated or depressed by the specimen when it becomes excited or alarmed; sides of head and face covered with caruncles—the larger, the better

Bill: Rather short, of medium width.

Eyes: Of medium size having slightly over-arched socket.

Neck: Of medium length, well-arched.

Wings: Very long, stout.

Back: Long, broad, somewhat flat.

Tail: Rather long, with abundance of stiff plumage.

Breast: Broad and full.

Body: Long, broad; carriage nearly horizontal.

Legs and Toes: Lower thighs, very short, large; shanks, short, large, toes straight, connected by web.

Colour.

The Black and White.

Head: Plumage glossy black and white.

Bill: Pink, shaded with horn.

Eyes: Brown.

Face: Caruncles, red.

Neck: Black, may be slightly marked with white.

Wings: Fronts, white; bows, black intermingled with a number of white feathers; primaries, black, with white feathers permissible; secondaries, black; coverts, rich, lustrous, greenish-black.

Back: Lustrous, greenish-black.

Tail: Black.

Body and Breast: Lustrous, greenish-black, broken with white—the blacker the plumage, the better.

Legs and Toes: Lower thighs, black; shanks and toes, varying from yellow to dark lead.

The White.

Bill: Pinkish flesh colour.

Eyes: Blue.

Face: Caruncles, red.

Shanks and Toes: Pale orange.

Plumage: Web, quill, and fluff of feathers in all sections, pure white.

Weight: Drake, 10 to 12 lb. Ducks, 5 lb. to 7 lb.

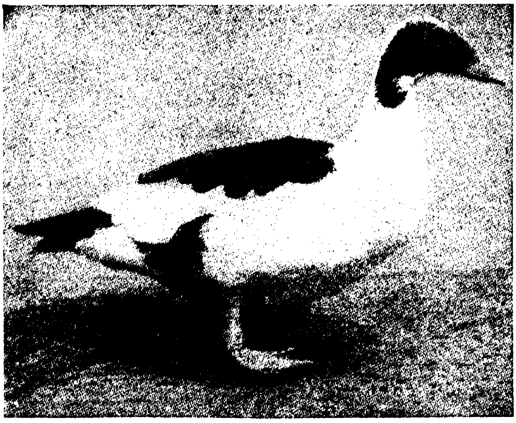


Plate 132.
A TYPICAL MUSCOVY DUCK.

Serious Defects.

All Varieties: Any breed defect or deformity.

Coloured: Smooth heads; plumage more than one-half white.

The White: Smooth heads; feathers other than pure white in any part of plumage, except dark markings on heads of young specimens.

INDIAN RUNNER.

General Characteristics.

Of the egg-producing ducks, the Indian Runner predominates in numbers. But the Khaki-Campbell is becoming very popular and is equal as a layer, whilst it is slightly heavier in body weight than Runners.

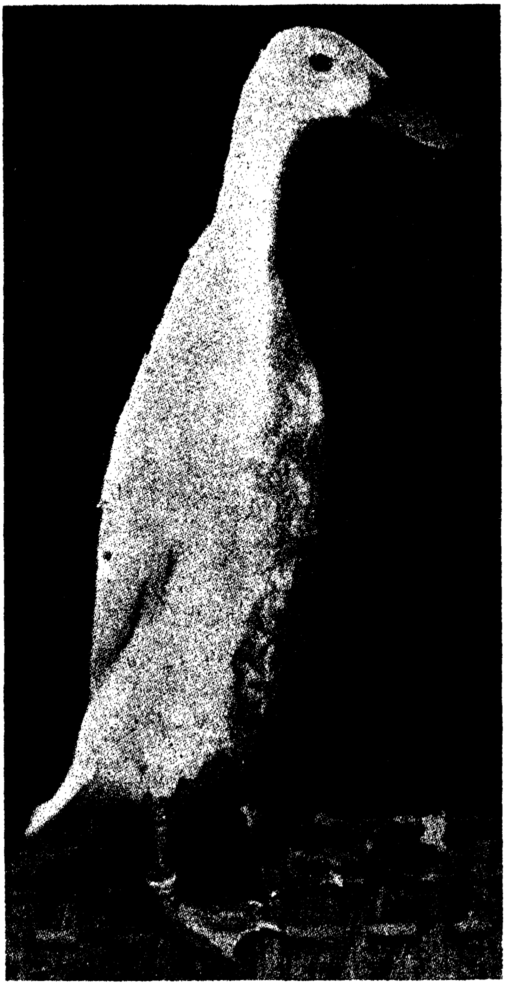


Plate 133.
WHITE INDIAN RUNNER DUCK.—Note upright carriage which is characteristic of this breed.

Head.—Fine and somewhat flattened over the skull, with the eyes full, bright and clear, showing alertness, and situated high up in the skull. Bill strong and deep at the base where it joins and fits almost insensibly into the skull, and thence comes as nearly as possible straight down to the tip, giving it a wedge-shaped appearance of good average length.

(*Note.*—The shape is more important than actual length or width, and it should be proportionate to the build and size of the bird and well set into the head at the junction. Very flat or dished bills with rounded under-line are objectionable, and abnormally long heavy bills are liable to be accompanied with coarse heads and thick necks, which are serious faults.)

Neck.—Neck very fine, thin and slender to where it begins to form the expansion towards the base of the neck, which expansion should fit almost insensibly into the upper part of the body, so as to appear almost part of it, the head and neck carried high and slightly forward, and not curved or carried swan-like.

Body.—Body—the lower portion of the neck expansion is included—long and narrow, of nearly uniform thickness, very tightly feathered. Wings closely packed; approximately about twice the length of the neck to the top of the head. When standing erect, the stern appears comparatively short and curves round to the tail, which is close and neat, and in the best specimens carried nearly in a line with the body, but in some excellent birds it is slightly elevated or turned upwards, and a fullness of the lower stern is frequent in the most prolific layers.

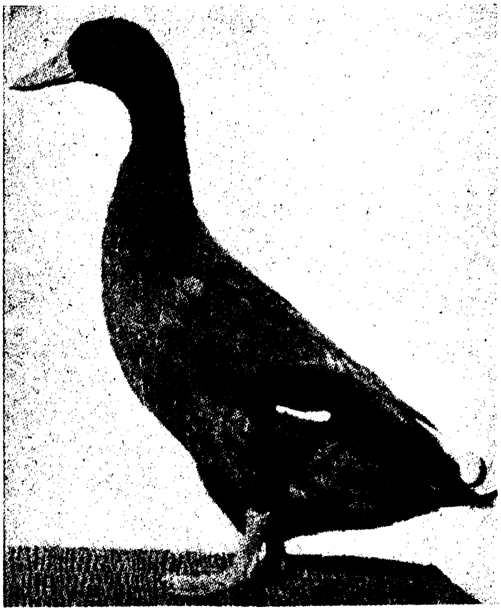


Plate 134.

A KHAKI-CAMPBELL DRAKE.—A Prolific Laying Breed.

Legs.—Legs placed much farther back than in the other breeds of domestic ducks. Shanks comparatively short, with small supple feet and strong thighs to enable the bird to balance properly and maintain an upright position when on the run.

Length and Size.—As layers of a great number of large eggs, substance and constitution are necessary in the breed; small, square specimens are useless, while heavy bulky birds are less active as foragers and open to the same objections. A medium size with good reach and perfect symmetry is advisable, but appearance and activity should be a truer guide than actual weight and measurements.

Carriage.—In comparison with other ducks, the body is more tightly feathered and appears longer and thinner, and this impression is heightened by the remarkable erect carriage and the fact that the bird when on the alert carries its neck and body almost in a line at an angle of from 50 to 70 degrees to the horizon. Its gait is peculiar in that it travels with a straight-out run and does not waddle or roll like the ordinary duck. In general appearance and shape when in motion, it has, not inaptly, been likened to a soda-water bottle set at an angle of 50 to 60 deg., a character which is best seen in a front or semi-front view. When startled, standing at attention, or trained in the show pen, it assumes an almost perpendicular pose or attitude.

Weight.—Drakes, 3½ lb. to 5 lb.; length 26 inches to 32 inches. Ducks, 3 lb. to 4½ lb.; length 24 inches to 28 inches. The above are fair standard weights and lengths, but must count for nothing if not accompanied with type and well-balanced proportions.

There are three varieties—Fawn, Fawn and White, and the White.

THE KHAKI-CAMPBELL DUCK.

General Characteristics.

This is a moderately small breed, the body being wide and fairly deep, with slightly upright carriage and finely-shaped head and neck. In the male the bill is green (the darker the better), the head, neck, stern, and wing-bar bronze, and the rest of the body an even shade of khaki or dark buff, with dark orange legs and feet. In the female the bill is greenish-black, the plumage being khaki or dark buff all over, with even ground colours while the back and wings are laced with a lighter shade of buff, and the legs are dull orange, both bill and legs being several shades darker than in the drake. Lightish feathers in the wings are allowed, but white bibs are untypical, as are yellow bills. Khaki-Campbells are tame and tractable creatures, and prolific layers of white eggs.

Weight—both sexes, 4½ lb.

THE DUCK-YARD SITE.

The selection of a site for duck raising as a commercial venture should receive very careful consideration, based on the water supply, the nature of the soil, available foodstuffs and the market for the products.

An abundant water supply is essential. A small running creek is quite satisfactory if the ducks can be kept within an enclosure during their laying period, and if all precautions are taken against the risk of their being carried down stream during heavy flood rains. In such a watercourse, the birds may obtain much of their natural foods.

The type of soil is of great importance, the best being one of a sandy nature. Heavy soils become caked with excreta which it is incapable of absorbing even during wet weather. Consequently, disease conditions conducive to serious losses may easily be set up. Land well drained and with sandy soil and a gradual slope to a point between north and east is the best site for a duck farm.

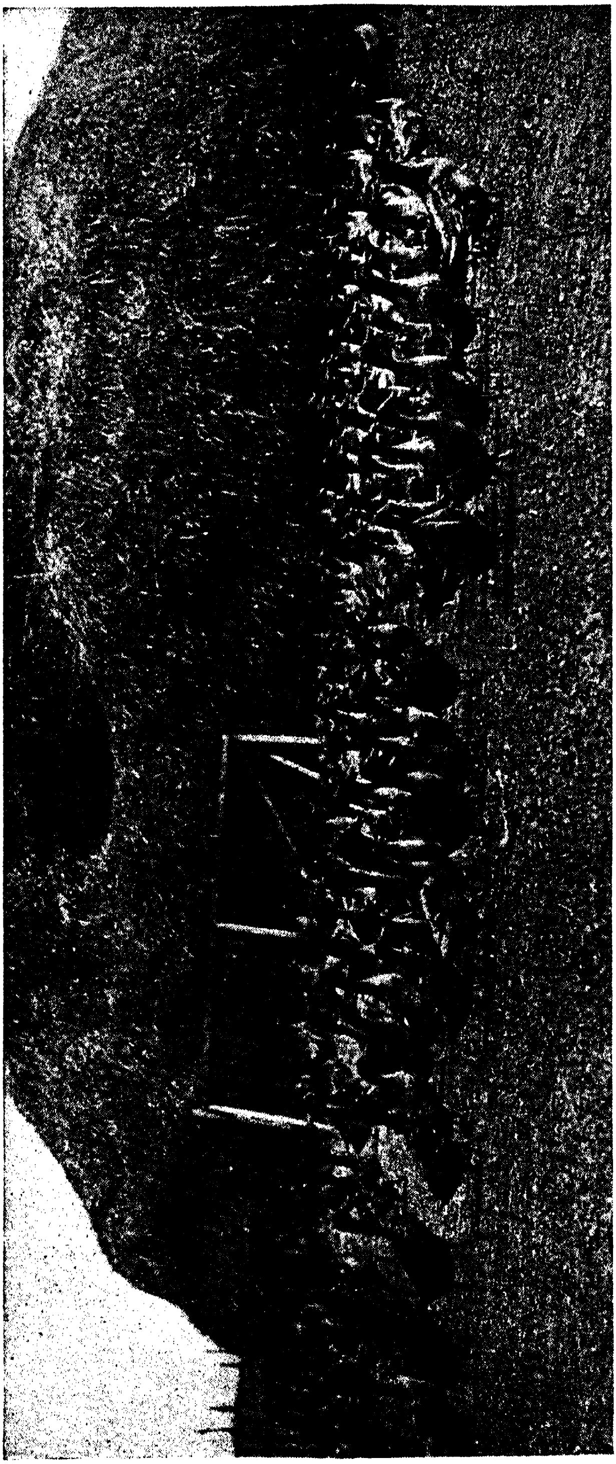


Plate 135.

A FARM FLOCK OF KHAKI-CAMPBELL DUCKS.

A duck farm should be in close proximity to a large town in which cheap foodstuffs are obtainable and which will provide a ready market for the products of the enterprise.

The market for ducks for the table and for duck eggs is somewhat limited—both products being subject to the vagaries of popular taste and varying demand—therefore the necessity for economical feeding is emphasized.

HOUSING.

The mild climatic conditions in Queensland obviate the necessity for the construction of elaborate or costly houses for the accommodation of ducks. That does not mean that ducks can be herded profitably into any class of a house. Houses should be built similar in design to ordinary poultry-houses, a lean-to building facing north or north-east, open-fronted, with a ventilation space at the top of the back wall. Buildings so constructed will afford the ducks most protection against prevailing winds and rains, while at the same time the sun's rays penetrate into the house.

Construction.—The building need not be deeper than 5 feet, and the roof could be 6 feet high at the front and 5 feet high at the back, and a ventilation space of 3 inches at the top of the back wall would be satisfactory. In estimating the size of the building, allow 2 square feet of floor space for each duck; thus, a building 10 feet long and 5 feet deep will accommodate twenty-five ducks. The best materials for the construction of duck houses is sawn hardwood and galvanised corrugated iron. Some may desire to make use of bush saplings so as to have cheaply constructed buildings; this may be done, but it is essential to have an iron roof.

Floors.—The floor of the house should be dry at all times; a damp or wet floor in a duck house may cause many deaths among the flock, while practically the whole flock will receive a check in growth or production. To ensure dry floors, build up the floor at least 4 inches above the level of the surrounding land; also excavate drains on the highest side of the house, so as to carry away storm water. Concrete floors are best, but an earth floor which has been tamped down fairly hard will be satisfactory. To facilitate cleaning, cover the floor with coarse sand or a litter of hay, grass, or straw. The litter will provide bedding for the ducks. Nests should be placed on the floor against the walls.

BREEDING.

It will be found most profitable to adopt the same breeding season for light-breed ducks as generally adopted for other poultry—namely, June to September. Ducks hatched during these months will commence laying when egg values are high, and continue for about twelve months before moulting. Heavy breeds hatched during June, July, and mid-August, will be more profitable, as they can be marketed in prime condition for the Christmas trade. The breeding of heavy breeds may be continued throughout the year, providing that a constant supply of cheap suitable foodstuffs is available.

Selection and Mating.—Care should be exercised in the selection of breeding stock. Special attention should be given to type and size. A careful study of the description of the breed is necessary, so as to be able to select birds reasonably true to type. Ducks tend to detoriorate very rapidly in size; therefore, it is essential to maintain size of body when selecting breeding birds. In this regard, it is a good practice to weigh the birds before placing them in the breeding pen. Defective ducks should not be used for breeding. In mating, the number of females to mate with each male varies with the age of the drake, size of run, whether the birds have access to a swimming pool, and the breed. On an average, mate between six and eight ducks with each light-breed drake, and from four to six ducks with each heavy-breed drake. The number of ducks may be increased if the drake is young and very vigorous. Ducks may be safely bred from until they are three or four years old.

Plate 136.
THE PROPER WAY OF HOLDING A DUCK.

MANAGEMENT.

Ducks should be kept apart from fowls, as they are greedy feeders and often prevent fowls from obtaining sufficient food. Their way of feeding is also slightly different. Ducks also make the drinking water unsuitable for fowls. A swimming pool is not a necessity, but where ducks have access to a pool they keep in better health, their plumage is cleaner, and they are freer from external parasites. Moreover, a higher degree of fertility results if breeding birds have access to a swimming pool As the duck usually lays in the night or early morning, it is necessary to confine them to the run or house until about 9 a.m., otherwise many eggs may be laid in the pool.

Ducks should have a constant supply of clean, cool, fresh water, and when confined during the night water should be supplied. The water vessels should be deep enough for the duck to submerge its head.

Ducks are naturally clean in their habits, but if kept in a small enclosure improperly drained, filthy conditions will result. Therefore, strict sanitation should be practised.

When kept in large numbers, ducks, particularly Indian Runners, are very excitable and easily frightened; if frightened they are very liable to go into a partial moult.

INCUBATION.

It is the usual practice not to set the first batch of eggs laid by a duck, these being often infertile; also, if fertile, weak ducklings are usually hatched from such eggs.

The period of incubation is 28 days for all breeds, with the exception of Muscovy eggs which take 35 days to hatch. The incubation of duck eggs is best done with ducks. If broody hens are used, it will be necessary to sprinkle the eggs with water daily. Also sprinkle water on the ground close to the nest, for when the hen comes off she will dust-bath, and her feathers will be moistened when she returns to the nest. Best results are obtained when the eggs are placed in an earth nest as the warmth of the hen's body will draw moisture up to the eggs and assist in maintaining the essential moisture for incubation. The duck, however, will moisten her feathers sufficiently before returning to the nest. With artificial incubation, the temperatures should be about 1 degree lower than that for hen eggs—namely, 102 degrees. After setting, the eggs should not be disturbed for 48 hours. Following this period they should be turned twice daily, and cooled daily. Each time the eggs are turned, before being returned to the machine they should be sprinkled with warm water. This sprinkling is essential, because the eggs require a lot of moisture. Test, and remove all infertile eggs. Do not open the machine after the ducklings commence chipping until the hatch is complete. Ducklings take longer to break out of the shell than chickens.

REARING.

Ducklings are very hardy, and easy to rear, therefore rearing may be done by artificial methods. Any type of a simple brooder that will permit of water being kept within access of the ducks will be satisfactory. For instance, a frame with four legs about 6 inches high to which is tacked a piece of hessian from which flannels hang to within an inch of the ground will give results. First place plenty of straw on the floor and then put down the brooder; the ducklings should be kept under the brooder the first day without food or water. To confine them, use inch netting close up all around the brooder. By adopting this practice they will know where to go when feeling cold. The following night they may be allowed 8 or 10 inches around the brooder, and in this space place water vessels. After about a week, it will not be necessary to confine them to the brooder. At about three weeks the brooder may be removed, providing that ample straw is placed in the shed. One important point should not be overlooked, and that is ground draughts should be prevented. Every day the straw should be forked up and, if necessary, replaced with clean, dry straw. Ducklings should not be crowded; best results will be obtained by rearing ducklings in small units. When about four weeks old they may be placed out in houses. for they do not then require much attention apart from plenty of food and water. Ducklings should be protected from the sun until they are well feathered on the head and neck; this is more important with Indian Runners than with other breeds. Therefore, the rearing pens should have a number of shade trees growing in them; if not, artificial shade should be provided.

FEEDING.

Ducklings require no food for 48 hours after hatching. During this period they may be supplied with water, coarse sand, and charcoal or wood ashes.

The following are mashes which will give excellent results:—

Foodstuff.	First Meal to 4 Weeks. Alternative Rations.		After 4 Weeks. Alternative Rations.	
	a	b	a	b
	Lb.	Lb.	Lb.	Lb.
Maizemeal	8	10	10	45
Pollard	10	..	55	..
Bran	..	..	25	..
Wheatmeal	..	7	..	45
Meatmeal	..	1	10	15
Dried Buttermilk	2	2	..	..
Bonemeal	2	2	1	1
	Oz.	Oz.		
Salt	2	2	1	1
Cooked vegetables or chaffed greenstuff	..	..	25	25

Because of the present shortage of pollard and bran, alternative rations are given which exclude these commodities.

Dissolve the salt in the liquid to be used for mixing the mash.

If these ingredients are mixed together, the amount for each meal may be moistened as required. If available, 3 lb. of curds may be substituted for the dried buttermilk, thus cheapening the ration. Skim milk is excellent for ducklings; it can be used to moisten the mash, but do not give it in the form of a drink. If there is ample milk available, allow it to curd and strain off the whey, then feed the curds. Imitate nature as far as possible by giving several small meals daily to young ducklings. A little and often is a good motto. When four weeks old, they may be fed on a similar ration to the mature ducks. When mature, it is only necessary to give them three meals daily, supplying as much food as the ducklings can consume in about half an hour. Be sure they have a big evening meal.

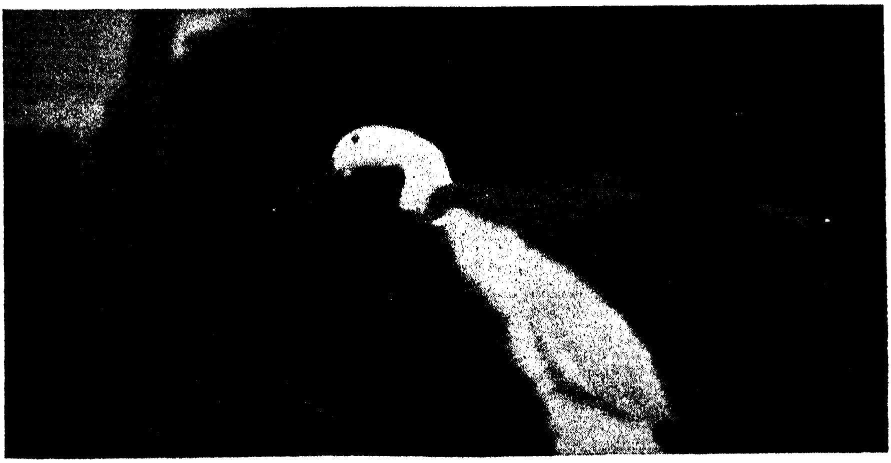


Plate 137.

RUNNER DUCKS SHOULD BE CAUGHT BY THE NECK.

Grown birds should receive two mashes daily, a small meal of whole maize could be fed to breeders in addition.

For the fattening of ducks, consideration must be given to the availability of cheap foodstuffs, which are often obtainable in the form of potatoes, pumpkins, and other vegetables; these should be boiled and may be added to the mash making up to 40 per cent. of the bulk. Chaffed greenstuff should be included, but do not add much greenstuff when making use of a large proportion of other cheap foodstuffs, otherwise the mash may be too bulky.

Always keep a supply of shell grit and coarse sand in receptacles before the birds. Ducks consume a large quantity of sand which is most beneficial as an aid to digestion, thereby enabling them to assimilate most of the nutriments contained in the foodstuffs.

WATER.

Water is one of the biggest factors in successful duck-keeping. Ducks should always have access to plenty of clean, cool, fresh drinking water. The water vessels or pool should be sufficiently deep to permit the ducks to submerge their heads. The water vessel should be kept under a shade tree or protected from the sun by providing shade. In rearing ducklings, it is a good plan to put a number of stones in the water vessels; this prevents the ducklings swimming and wasting the water.

Water vessels should be constructed so the ducklings can get out easily in the event of their swimming in the vessels, otherwise they may drown through cramp. This cramping is more likely to occur during cold weather.

COMMON TROUBLES.

As stated previously, ducklings are hardy and easily reared, but losses will occur if they are neglected. The most common troubles are chills and staggers.

Chills.—Symptoms—Watery eyes and nostrils. Cause—Wet or damp sleeping quarters.

Remedy—Keeping the floors dry is most important. The drinking water may be slightly coloured with permanganate of potash, and changed several times daily.

Staggers.—Symptoms—Ducklings stagger about and fall on their backs before dying. Cause—Lack of water. When water is supplied after there has been a shortage, the ducklings gorge themselves, bringing about this condition.

Remedy—Keep a constant supply of drinking water available for the ducklings.

A SPECIAL RADIO SERVICE FOR FARMERS

★ ★

The COUNTRY HOUR, a special service for farmers, is broadcast DAILY through the National and Regional Stations from 12.15 to 1.15 (mid-day)

ANIMAL HEALTH

The Use of Phenothiazine for the Treatment of Worms in Cattle.

By F. H. S. ROBERTS, Animal Health Station, Yeerongpilly.

PRIOR to the introduction of phenothiazine, the drenches usually recommended for the removal of worms from cattle were bluestone, bluestone and nicotine sulphate and tetrachlorethylene. Research on the use of worm drenches for sheep has received considerable attention, whilst comparatively little work along these lines has been carried out with cattle and these recommendations are based largely on the efficiency of the above drenches against the worm parasites affecting sheep.

The most harmful worm parasites of sheep and cattle occur in the fourth stomach and in the small and large bowel. The success of drenches containing bluestone in sheep depends on the fact that the bluestone closes the oesophageal grove and the drench is swallowed into the fourth stomach. The use of bluestone enables the drench to reach the fourth stomach in full strength. In the absence of bluestone, the drench in most animals is swallowed into the paunch and by the time it reaches the fourth stomach has become too diluted to be effective. Whether or no bluestone has a similar action in cattle remains to be determined. The evidence at the moment indicates that the oesophageal grove in these animals fails to respond to this drug. Some authorities claim that sodium bicarbonate will stimulate the closing of the grove in cattle, thus enabling drenches given after dosing with this chemical to be swallowed directly into the fourth stomach, but adequate proof of this has yet to be obtained.

In cattle, bluestone has been recommended for the large stomach worm; bluestone and nicotine sulphate for stomach worms, tapeworms, and small intestinal worms; and tetrachlorethylene for stomach worms and hookworms. To be effective, however, these drenches, as previously pointed out, must be swallowed directly into the fourth stomach. At the present time, we have no certain way of inducing this action; until we have, these drenches cannot be considered highly efficient.

Phenothiazine is very effective not only against stomach worms and small intestinal worms, but is the only drug known which has an efficient action against the nodule worms in the large bowel. Hookworms are apparently more resistant to it than the other parasites, but it would appear that even these can be controlled by using large doses. Phenothiazine has no action against tapeworms, but these parasites are, in general, of little importance. Furthermore, the efficient action of phenothiazine is independent of the route taken after it is swallowed. In so far as cattle and sheep are concerned, there is no doubt that phenothiazine approaches more closely to the "ideal" drench than any other drench so far introduced.

The Importance of Worms.

In this State, serious losses from worm infestation are common and widespread. These losses are experienced in both dairy and beef cattle and are most frequently seen in the coastal and sub-coastal districts. The most important factors which govern the development and survival of worms in the pastures are warmth and moisture, whilst the heavy rate of stocking which is encountered in these districts makes it an easy task for the larval worms in the pastures to gain access to their cattle host.

Young animals up to 18 months, and sometimes 2 years, of age, are most severely affected, calves being especially susceptible. In Queensland, as in many other countries, worm infestation takes its greatest toll during the period extending from the autumn to the early spring. As might be expected where a number of animals are grazing together in the same pasture, losses from worm infestation usually take the form of outbreaks in which a number of animals is involved.

The Important Species of Worms

There is a large number of different species of worms which infest cattle. Many of these are of little importance and may be ignored. Those which cause the most serious damage include:—

1. *The Large Stomach Worm.*—This is a conspicuous species up to 1¼ inches long occurring in the fourth stomach. The female is red and white spirally striped and is frequently called the "barber's pole" worm. It is readily seen when the fourth stomach is opened and when in large numbers occurs in tangled masses.

2. *The Small Intestinal Worm.*—These are small, pinkish, worms up to ¼ inch in length, which infest the first 20 to 30 feet of the small bowel. On account of their small size they are very difficult to see, but if scrapings are taken from the intestine wall and examined in water in a glass dish held over a black background, they can be detected.

3. *Hookworms.*—These are stout, whitish, worms up to an inch in length occurring in the first few feet of the small bowel. The mouth of this worm is provided with a number of teeth, by which it adheres firmly to the intestine wall.

4. *Nodule Worm.*—Also a stout whitish worm, this species is found in the large bowel. The worms lie closely against the bowel wall.

5. *Lungworm.*—This species is found in the air tubes of the lungs. It grows up to 3 inches and more in length, and when in large numbers, almost chokes the air passages.

How Cattle become Infested.

The female worms in the animals lay eggs which pass out in the dung. Under suitable conditions of temperature and moisture, a tiny, larval worm develops in the egg, which eventually hatches. The larva lives freely in the soil and vegetation and in the course of a few days is ready to infest the calf. To do this, it crawls up the grass, when the grass is wet with dew or rain, and is swallowed as the animal grazes. The hookworm larva can infect its host also by boring through its skin. Once it reaches its destination within the body, the fourth stomach, the intestine or the lungs, the larval worm settles down and grows to maturity.

Symptoms.

The most common symptoms of a heavy infestation is a gradual loss of condition. This is frequently accompanied by diarrhoea. The membranes lining the mouth and eyes may lose their healthy pink colour and become white. The coat becomes dry and harsh and the animal has a hide-bound appearance. Dropsical swellings under the jaw may be seen (bottle jaw) and the animal may become pot-bellied (Plate 138). Whilst the appetite frequently remains good, the animal eventually becomes too weak to stand or move about and finally dies. Infestations of lung worms sometimes accompany large numbers of worms in the fourth stomach and intestines and in such cases the presence of the lungworms is denoted by frequent coughing and difficulty in breathing.

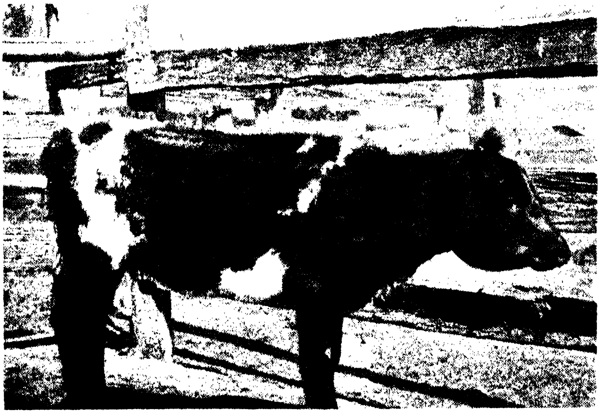


Plate 138.

TYPICAL APPEARANCE OF A CALF HEAVILY INFESTED WITH WORMS.

Treatment.

When animals have been permitted to reach the stage when they are showing marked symptoms of infestation, they should be treated twice with phenothiazine with an interval of 10 to 14 days between treatments. Every calf and yearling in the affected herd should be treated and not only those which are showing symptoms. The paragraphs on the use of spelled pastures and nutrition should be studied carefully (see p. 375) and the measures discussed here put into operation.

Many cattle owners consider the poor condition of the young stock during the winter as a sequence to the state of the pastures. The thought that worms may play a big part does not present itself until the animals are visibly wormy. Large numbers of worms are picked up during the warm moist weather of the summer and early autumn. Whilst the cold and dry conditions of winter considerably delay development of the larvae in the pastures and may cause heavy mortalities among them, the close grazing by the animals at this time of the year makes whatever larvae remain more accessible to the cattle. This means that whilst the bulk of the infestation takes place during the summer, some infestation also occurs during the winter particularly in those localities where the temperatures are mild.

It is therefore advisable to test all young stock

(a) in the autumn about March or early April;

(b) in June or July;

(c) in September.

The treatment in March or early April should remove the majority of the worms picked up during the summer and allow the animals to enter the winter fairly worm free. In very wormy areas, two treatments with a 10 to 14 day interval are advised. The second treatment in June or July would take care of worms which survived the earlier treatment or have been picked up since. The September treatment is advisable for with the three treatments plus the unfavourable effect of the cold and dry conditions on the larvae in the pastures, both the animals and the pastures will enter the spring with only very small infestations.

Administration of Phenothiazine.

Phenothiazine is available under the trade names of Phenovis, Phenzeen and Phenoveen and may be purchased from any firm which deals with supplies for the farmer or grazier. The dose rates are as follows:—

Animals—

2 to 4 months	½ oz. phenothiazine
4 to 6 months	¾ oz. phenothiazine
6 to 12 months	1 oz. phenothiazine
12 to 18 months	1½ oz. phenothiazine
over 18 months	2 oz. phenothiazine

Phenothiazine is not soluble in water, but can be suspended in water to be given as a drench. Weigh out the total amount of phenothiazine required to treat all the animals in the herd. Pass the powder through a sieve to remove all lumps. A kitchen flour sifter is very suitable for this purpose. Measure out 12 fluid oz. of water for each one pound of phenothiazine. Pour the water on to the powder gradually, stirring vigorously to form a thin paste. The doses of this fluid containing the amounts of phenothiazine set out above are then—

2 to 4 months	¾ fluid oz.
4 to 6 months	1⅛ fluid oz.
6 to 12 months	1½ fluid oz.
12 to 18 months	2¼ fluid oz.
over 18 months	3 fluid oz.

The above suspension is, in some quarters, considered too thick to use without some difficulty. A thinner suspension may be made by mixing 16 fluid oz. of water with each pound of phenothiazine. The dose rates of this mixture would be—

2 to 4 months	1 fluid oz.
4 to 6 months	1½ fluid oz.
6 to 12 months	2 fluid oz.
12 to 18 months	3 fluid oz.
over 18 months	4 fluid oz.

Starvation is not required either before or after treatment. The suspension may be given either with a drenching gun or with drenching funnels. The mixture must be kept well stirred during drenching otherwise the phenothiazine will sink to the bottom. There are drenching guns which are especially designed for phenothiazine. These may clog after some use but this can be avoided by frequent washing with water.

Ill effects are sometimes seen in cattle after using phenothiazine. Reports have been received of an eye condition resembling blight following drenching with this drug. This effect, however, soon disappears. It is thought to be due to exposure to sunlight after treatment. The urine may be stained red for some days, but this is of no importance.

Nutrition.

The importance of nutrition in the control of worm parasites is shown by the fact that during the summer months when the pastures are at their best outbreaks are relatively few; whilst during the winter, when the pastures are poor, outbreaks are common and widespread. Supplementary feeding during the winter months would play a very important role in controlling worm parasites. Again where phenothiazine is used to treat animals showing marked symptoms of infestation, treatment should be followed by supplementary feeding to assist the animals to recover. Frequently, treatment of heavily infested animals may not be followed by any marked improvement in their condition, simply because, although most of the worms have been removed, the animals are unable to obtain sufficient nourishment from the pastures to repair the damage caused by the infestation.

The Value of Spelled Pastures.

Although some larvae can survive in pastures up to 12 months and more, a large percentage will die in 4 to 6 weeks unless they gain access to cattle. This is particularly the case during the dry winter months. Little benefit may be gained from treatment if the animals remain in a heavily contaminated pasture and the owner who can move his young stock after treatment into a pasture which has been spelled from cattle for 4 to 6 weeks has a decided advantage in his fight against worm parasites. One reason for the outbreaks which occur year after year is the use of permanent calf pastures. Subdivision of the land so that several pastures can be set aside for the young animals, each pasture being used only after it has been free of cattle for 4 to 6 weeks, will greatly assist in protecting the young stock. Pastures being spelled could be grazed by horses, as the worms infesting the horse cannot establish themselves in cattle and vice versa.

Finally, in selecting calf pastures well drained land, free from swamp, should be given preference.

GENERAL NOTES

Army Buildings for Experiment Stations.

Executive approval has been given for the purchase through the Disposals Commission of buildings and equipment at Kairi State Farm for use on departmental experiment stations. The buildings referred to are on the Kairi State Farm, which is to be opened as a Regional Experiment Station when vacated by the Army. The equipment was used on the farm during Army occupancy.

Staff Changes and Appointments.

Mr. P. L. Pfrunder (of Pozieres, via Cottonvale) has been appointed an Inspector under the Diseases in Plants Acts.

Mr. S. B. Myles, Inspector, Division II., Division of Animal Industry, Cadarga, has been transferred to Brisbane, and Mr. S. J. B. Prior, Inspector, Division II., on probation, under *The Diseases in Stock Acts*, 1915 *to* 1944, and under *The Slaughtering Act of* 1898, has been transferred from Brisbane to Cadarga.

The position of Inspector, Division I., Division of Animal Industry, Maryborough, has been gazetted, and action will be taken to fill this position.

Correspondence Course in Pig Raising.

The Department of Agriculture and Stock offers to persons interested in pig raising a free course of instruction by correspondence. This course comprises forty-eight lessons, one or more of which may be completed each week, according to the time available for study.

The lessons cover breeds, selection of stock, breeding, feeding, management, and marketing; plans of piggery equipment and notes on pig feeds also are included. There is also a section dealing with slaughtering and farm curing of bacon.

Farmers, farm workers, or those interested in rearing pigs but not farming, may enroll by forwarding a written application to the Under Secretary, Department of Agriculture and Stock, William street, Brisbane.

ANSWERS.

(Selected from the outgoing mail of the Government Botanist.)

Caustic Poison Plants.

H.S. (Wyandra)—

Your specimens are often referred to as Bottle Tree Caustic. The botanical name is *Euphorbia eremophila*. Feeding experiments with cattle and sheep in New South Wales produced only slight diarrhoea. At Yeerongpilly Animal Health Station a sheep was force-fed with several pounds of this plant, but no poisonous effects were noticed. However, we have had reports that this plant causes symptoms similar to those brought about by the Creeping Caustic (*Euphorbia Drummondii*), such as intense swelling of the head and neck.

One of the Bottle Tree Family.

A.F.M. (Yeppoon)—

Your specimen came from the tree which is known botanically as *Sterculia quadrifida*. This is found in the rain forests from northern New South Wales up to Thursday Island. Neither the seeds nor the leaves are known to be poisonous to animals. As a matter of fact, the seeds have been roasted and ground as a substitute for coffee.

Rural Topics

This isn't Udder Nonsense.

It was no "udder nonsense" that was dished out in a recent release by the Wisconsin Department of Agriculture on importance of protecting the udder of the modern milk cow.

A 10-point "udderance" set forth the following:—

1. To be successful a dairyman must be udderwise.
2. All that a dairyman is he owes to udders.
3. Many udder facts need to be known.
4. While feed is important, milk is made from udder materials.
5. Don't expect good result from a cow that is udderly neglected.
6. Many cows are udderly ruined by poor milking.
7. Udder injuries produce mastitis.
8. Be considerate of udders and the reward shall be yours.
9. Do unto udders as you would have them return unto you.
10. The cow's udder is the biggest money bag in Wisconsin agriculture.

But the udder part of the news release was in a serious mood. It pointed out that in the development of the modern milk cow, capacity in some cases had been increased 1,000 per cent. Whereas a native or range cow gives from 5 to 10 lb. of milk a day, a good dairy cow can produce as much as 100 lb. each twenty-four hours.

The great increase in productivity subjects the udder to a great deal of strain, making it more susceptible to injury and disease.

The small udder of the native cow is protected by her flanks, which offer but little protection for the much enlarged udder of the well-developed dairy cow.—*National Butter and Cheese Journal* (U.S.A.), Feb., 1946.

Is Our Soil a Vanishing Asset?

A recent addition to the central library of the Department is *Food or Famine—The Challenge of Erosion.* The author, Ward Sheppard, has specialised in large-scale enterprises of soil, forest, and water conservation in the United States and is now a conservationist in the Indian Service. He asks can civilisation conquer soil erosion before soil erosion destroys civilization? This book is no mere catalogue of destruction. Starting from the basic fact that world-wide soil erosion is an ominous threat to civilisation, he raises and systematically answers the question, what are we going to do about it? Rejecting sentimental propaganda, he advocates as the first step the continent-wide organisation of land management districts, with expert guidance, to apply scientific management to our farms, forests, and grasslands.

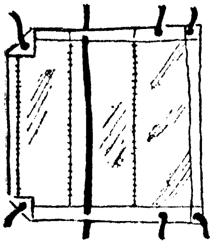
Erosion is definitely one of our fundamental farming problems. The kind of answer we give to its challenge will spell the difference between food and famine, between a civilisation of stability, vigour, and economic balance; and a civilisation like "a gaudy excrescence on top of a rotting foundation."

We often hear the term the "conquest of nature." As a matter of fact, we don't conquer nature. The best we can do, says the author of *Food or Famine*, is to co-operate with nature on the terms and conditions set by nature—that is, if we are clever enough to learn all about nature's ways and enter into a two-way bargain with her. Nature has the whip hand, anyhow. It is no use trying to rob her of riches without replenishment and expect to get away with it. Otherwise, erosion, floods, droughts, and the silting up of river systems will be the penalty—a penalty which, in the end, means stark starvation. War and erosion are the twin scourges of civilisation, and it's a remarkable thing and a sobering thought that with all his thousands of years of civilisation, man has not yet mastered either of his two main jobs: making peace with nature, or making peace with his fellow-man.

The obvious moral of all this is that we must restore our sense of soil and recognise it as a living organism. A farm is not a factory, nor should the farmer be just a food mechanic. If we think and act along those lines, however, nature will surely take revenge. Conservation must become the core of our agriculture.

GADGETS AND WRINKLES

COW RUGS FROM CORNSACKS.

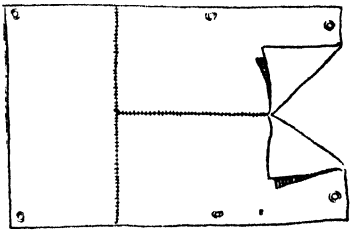


Useful cow rugs can be made from old cornsacks, as illustrated.

Three bags are used in the manner shown—this giving double thickness—but if only lightweight rugs are required, 1½ bags will do.

The sketch will show the arrangement of the bags—straps or rope is used to go through the holes shown; one advantage being that one strap goes right across and round the body just behind the forelegs and shoulder so that the rug will stay in place. In both this and the following idea, the straps or ropes would be more easily and quickly handled if some small coupling arrangements were fixed to the ends so that they could be quickly fastened.

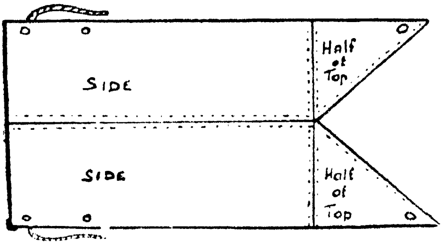
ANOTHER COW RUG.



This is somewhat similar—3 bags being used, but this time the two sides are sewn only as far as indicated in the sketch; the balance of the sacks being turned down as shown in order to fit round the neck and chest.

Straps, cord or rope is tied through the holes indicated—the middle ones going right round the girth—the back ones connecting across the hind legs and the other two meeting across the chest. One way of keeping the rug in place is to fix extra wide straps or material round the girth, whilst other straps could be added where necessary.

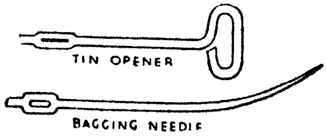
COW RUGS FROM WOOLPACKS.



This sketch shows one way of doing this; one pack making two rugs.

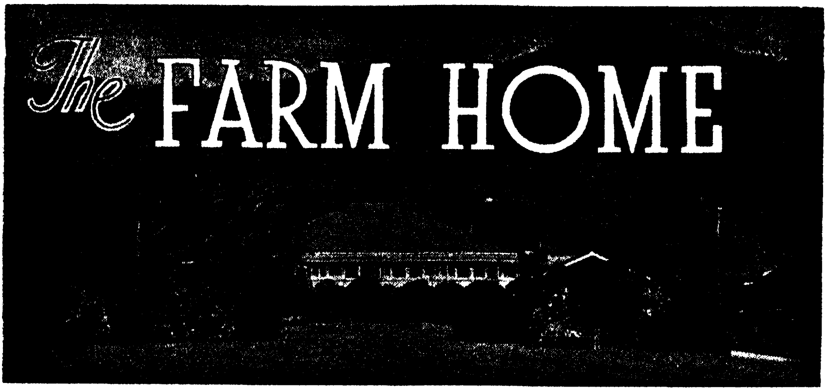
The best way to cut the top and the bottom of the pack is to make one cut of each, straight from corner to corner, and then to fix as indicated. This type is quickly and easily made and will be found quite serviceable for all normal requirements.

HOME-MADE BAGGING NEEDLES.



Home-made needles can be made as shown here—this particular one being made from an ordinary sardine tin opener.

The handle of the tin-opener is straightened out, then hammered almost flat, after which it is filed or ground sharp and bent to the desired curve. At the opposite end, the slot to form the eye will need to be opened slightly with a chisel.



Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

A SNEEZE HAS BEEN PHOTOGRAPHED.

THE season of colds is with us again and with it the people, who through ignorance or carelessness, infect their own children, and other people's children, with colds by coughing and sneezing into the atmosphere. An ordinary sneeze will project into the air many thousands of droplets laden with germs at an initial velocity of 150 feet per second. This has been proved by the ingenious method of flash photographing a sneeze; by this means also it was shown that a large number of germs carrying droplets from this sneeze were small enough and light enough to remain suspended in the air for over 15 minutes. This means that any person within 4 feet and at the same height as the sneeze may become infected with a cold. Travelling in the train recently a Child Welfare sister felt very nervous for a bright little child of three sitting on her mother's lap next to a person who coughed explosively into the air for the whole 20 minutes journey, and did not use a handkerchief once because she was knitting. *Don't forget that the little cold of the big person may mean a big cold in a little person.*

Of the 1,014 babies and children who died last year before reaching the age of five years, 116 died from infections, which affect the nose, throat, bronchial tubes, and lungs, and many of these would commence with just a common cold. The sickness rate was, of course, much higher. Knowing this it is the duty of every father and mother to learn about these infections, so that they can not only protect their own children from them, but help to lessen the number of other children who contract them, and so prevent much unnecessary illness and suffering among the little ones.

The first thing we have to realise is that the reason colds and similar infections are so prevalent in the winter is because buildings and public vehicles are closed up to keep out draughts, and so there is no moving current of air to blow away the germ-laden spray from sneezes and coughs.

The trouble is that so many people accept the common cold as inevitable and not much to worry about, and do not realise that it is highly infectious and is often the forerunner of bronchitis and pneumonia.

How to Prevent Colds.

1. First we must develop a public health conscience in our community by teaching people the danger to others associated with sneezing and coughing without covering mouth and nose with a handkerchief.

2. Practise what we preach. Show our children, by example, the importance of clean habits.

3. Strengthen the children's natural defences by keeping them out of crowds and giving them plenty of fresh air and sunshine, the commonest, cheapest and most precious things around us. Fresh cold air does children good if they are warmly clothed. "Bottled Sunshine" (Cod Liver Oil or Emulsion) should be given if the weather is dull or wet.

4. See that the children have a nourishing and vitamin-rich diet. The sister at your Welfare Centre will advise you about this.

5. Dress the children according to the temperature of the day, not the time of the year.

6. See that they have a long unbroken sleep each night and a day-time nap or rest as well.

Any further advice on this or any other matter can be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau,* 184 *St. Paul's Terrace, Brisbane,* or by addressing letters, *Baby Clinic, Brisbane.* These letters need not be stamped.

IN THE FARM KITCHEN.

Cheese Pancakes.

Use 8 tablespoons flour, 4 eggs, 4 tablespoons grated cheese, salt, enough milk to mix it into a fairly thick paste. Mix the flour and half of the cheese, whisk egg yolks well, add salt and milk, add this to the flour mixture, then add well-beaten egg whites. Bake a light brown, sprinkle with the other half of the cheese, roll, and serve while hot.

Banana Fritters.

Take 1 cup of mashed bananas, the juice of half a lemon, ½ cup of flour, 1 teaspoon of baking powder, 5 tablespoons of sugar, an eighth of a teaspoon of cinnamon, 1 egg, ¼ of a cup of milk. Add the lemon juice to the mashed bananas, then add the sifted dry ingredients. Add the egg yolk and milk. Fold in the stiffly-beaten egg white and mix into a stiff dough. Drop into hot fat and fry until brown.

Turnips.

When boiling turnips add a teaspoon of sugar but no salt. This tends to make them soft and smooth, instead of stringy. To glaze: Boil turnips in salted water for 10 minutes, then drain. Melt 2 oz. butter in a baking dish; cut turnips in halves and place in dish. Sprinkle the tops with salt, pepper and sugar. Bake in slow oven until brown, stirring frequently, then add some milk or stock and continue to cook until tender and glazed. Baste frequently.

Curried Beans.

Take 2 cups haricot beans, 1 apple, 2 tablespoons butter, 1 dessertspoon curry powder, 1 onion, 1 carrot, 1 cup water or stock, tomato sauce. Soak beans overnight in cold water, drain, place in saucepan with water to cover and bring to boil. Drain again, cover with boiling water, and cook till tender. Chop onion and apple, grate carrot, fry together in the butter and put in saucepan with 1 cup of stock from the beans. Stir in currypowder blended with water, add salt and tomato sauce and simmer 10 minutes. Add cooked beans and serve very hot.

Carrots.

Melt 3 tablespoons butter, and in it slightly brown an onion. Add 2 cups cold sliced carrot, mix well, add pepper and salt, and cook till butter is absorbed. Sprinkle with parsley. Young carrots are nice if parboiled, then put in a saucepan with a little butter, and allowed to brown. Serge with brown sauce.

Cabbage Savoury.

Use left-over cabbage for this. Also some cold cooked potatoes, which should be cut into fairly thick slices. Fry all in butter till lightly browned, turn on to a hot dish, and then fry some eggs to serve with it. If preferred fried bacon or meat may be served instead.

QUEENSLAND WEATHER IN MAY.

Rainfall over the whole State was well below average, only three Stations recording over average amounts (Thursday Island 317 points above, and in the North Coast Barron Division Archer Point 42 points above and Mossman 22 points above). The North Coast Divisions received the best distribution, due to fairly general moderate to locally heavy showers, which accompanied a persistent south-easterly stream during the second week of the month. These showers brought considerable relief to canegrowers in these divisions, but further substantial falls are now needed to maintain any growth thus induced in young crops. In other cane-growing districts, only scattered light showers and thunderstorms have been received, and any earlier hopes for a high seasonal yield will not be realised. Stations in the Carpentaria, Central Lowlands, Upper and Lower Western, Warrego, and Far South-West again, with very few exceptions, reported no rain, and the scarcity of sufficient winter feed is serious. Fears are expressed for the survival of weakened stock during the usual winter cold spells, two of which have already been experienced. In the Central Highlands, Darling Downs, and Maranoa Divisions scattered light to moderate falls, which accompanied weak trough conditions during the first and third weeks, have brought only slight relief to pastoralists. Continued lack of rain in the Burnett, Callide, and Dawson Valleys of the South Coast-Port Curtis Divisions has created drought conditions, for which State Government aid is being sought.

Pressure.—From 2nd to 7th inclusive a moderately intense anti-cyclone dominated the situation over eastern Australia, with the result that fine weather prevailed over the whole of the State except for isolated showers along the Central and North Coasts. A "low" was located at 9 a.m., 15th, moving into the Great Australian Bight area, with the anti-cyclonic belt extending over sub-tropical Australia gradually losing energy. By 9 a.m., 16th, the "low" had revealed itself as an intense closed depression centred south of the Bight and moving rapidly eastwards, being followed by an equally strong anti-cyclone. This depression continued to intensify and moved eastwards, and by 18th it had moved into the South Tasman Sea with a second small centred forming over inland New South Wales. During the passage of the depression's primary cold front through western and south-western Queensland severe dust storms occurred, the dust haze from which extended eastwards, so that by the morning of 18th the whole of the south-east quarter of the State was covered by a dust layer in which horizontal visibility was nowhere greater than 1 mile. On 19th the eastern half of the Continent was brought under the influence of a strong, deep south to south-west flow of modified Polar Air, which gave Queensland its coldest spell since last winter. The passage of secondary cold front through the south-eastern quarter of the State on 19th was accompanied by moderate falls of snow in the Granite Belt region of the Darling Downs and scattered hail storms. The depression moved rapidly across the Tasman Sea, and by 21st the whole Continent was again under the influence of anti-cyclonic control, and in the Queensland area winds quickly moderated and temperatures became milder. This control persisted until 25th, the anti-cyclone over New South Wales showing little movement and maintaining mainly fine weather over the State, except for local coastal showers. On the 26th, two small anti-cyclonic cells had formed, one over the north Tasman Sea, and the other along the northern tableland area of New South Wales extending into south-east Queensland. The individual weak circulations accompanying these two cells were sufficient to give weak trough conditions along the Central and South Coast areas on 26th and 27th when isolated evening storms were reported. At 9 a.m., 28th, an intense depression below 988 mbs. was located south of Western Australia moving rapidly eastwards, displacing the "high" over New South Wales and causing milder conditions as the winds over Queensland swung more northerly. This intense depression continued its rapid movement on an east to south-east course, with the result that a well-defined trough extended from the Tasmanian area into south-west and west Queensland at 9 a.m., 30th. The cold fronts accompanying this trough were only sufficiently active to cause local dust storms in the dry inland areas and very isolated showers on the Darling Downs as they moved eastwards. The fronts had passed the south Queensland coast by the afternoon of 31st and were followed by a renewal of a cold south-west stream over the whole of sub-tropical Queensland.

Temperatures.—May, generally speaking, was milder than usual, except during the middle and at the end of the month, when colder spells were experienced. These milder conditions were reflected by the maximum temperatures, which were above normal in all Divisions, varying from 1.1 deg. above normal at Cairns to 5.6 deg. above normal at Longreach. Minimum temperatures also were normal or above normal except in the Peninsula and South Coast-Curtis Divisions, where they varied from 0.8 deg. below normal at Rockhampton to 3.7 deg. below at Palmerville. In other divisions, minimum temperatures varied from normal temperature at Georgetown to 3.9 deg. above at Longreach.

The rainfall position is summarised below :—

Division.	Normal Mean.	Mean May, 1946.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	137	128	7 below
Peninsula South	50	11	78 ,,
Lower Carpentaria	38	3	92 ,,
Upper Carpentaria	58	Nil	100 ,,
North Coast, Barron	300	238	21 ,,
North Coast, Herbert	434	232	47 ,,
Central Coast, East	165	61	63 ,,
Central Coast, West	81	3	96 ,,
Central Highlands	127	12	91 ,,
Central Lowlands	87	10	88 ,,
Upper Western	51	Nil	100 ,,
Lower Western	69	Nil	100 ,,
South Coast, Port Curtis	203	51	75 ,,
South Coast, Moreton	349	62	82 ,,
Darling Downs, East	156	39	75 ,,
Darling Downs, West	143	6	96 ,,
Maranoa	137	5	96 ,,
Warrego	112	Nil	100 ,,
Far South-West	97	Nil	100 ,,

Commonwealth of Australia, Meteorological Bureau, Brisbane, 5th June, 1946.

ASTRONOMICAL DATA FOR QUEENSLAND.

JULY.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	6.39	5.03	Cairns	9	48	Longreach	27	43
6	6.39	5.05	Charleville.. ..	25	29	Quilpie	37	33
11	6.39	5.07	Cloncurry	37	62	Rockhampton ..	2	18
16	6.38	5.10	Cunnamulla ..	30	28	Roma	15	19
21	6.36	5.12	Dirranbandi ..	21	17	Townsville.. ..	9	40
26	6.34	5.15	Emerald	12	27	Winton	30	51
31	6.31	5.17	Hughenden ..	22	48	Warwick	5	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	a.m.	p.m.
1	8.30	7.15
2	9.20	8.20
3	10.03	9.23
4	10.40	10.22
5	11.13	11.18
6	11.45	..
	p.m.	a.m.
7	12.16	12.11
8	12.46	1.04
9	1.19	1.57
10	1.54	2.51
11	2.33	2.45
12	3.16	4.38
13	4.04	5.32
14	4.56	6.23
15	5.51	7.12
16	6.49	7.58
17	7.47	8.39
18	8.46	9.17
19	9.45	9.52
20	10.44	10.26
21	11.44	11.01
22	..	11.37
	a.m.	p.m.
23	12.47	12.16
24	1.52	12.59
25	3.00	1.49
26	4.08	2.45
27	5.14	3.47
28	6.14	4.53
29	7.07	6.00
30	7.54	7.05
31	8.34	8.06

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	11	27	26	43	1	18	29	51
6	19	19	35	35	10	10	40	40
11	28	12	44	27	19	2	51	30
16	27	12	43	27	18	2	50	30
21	17	20	32	36	8	11	37	42
26	11	29	26	44	0	19	28	52
31	14	23	30	39	5	14	34	45

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	7	48	36	62	21	48	8	40
3	14	41	41	58	26	43	14	34
5	24	32	47	52	32	37	21	27
7	33	26	53	47	38	33	28	22
9	43	16	59	42	44	27	36	16
11	50	9	64	37	48	23	41	10
13	53	5	67	34	50	20	44	7
15	51	5	65	34	49	20	42	7
17	44	11	60	38	45	24	36	12
19	34	20	54	44	38	29	29	18
21	23	32	46	52	31	37	21	27
23	18	42	43	58	28	44	17	35
25	9	49	37	63	22	49	9	41
27	5	52	35	65	20	50	6	44
29	8	47	37	62	21	47	8	39
31	16	39	42	57	27	42	16	33

Phases of the Moon.—First Quarter, 6th July, 3.15 p.m.; Full Moon, 14th July, 7.22 p.m.; Last Quarter, 22nd July, 5.52 a.m.; New Moon, 28th July, 9.53 p.m.

At the end of the month the Sun will rise and set approximately 20 degrees north of true east and true west respectively. On 6th and 20th July the Moon will rise and set approximately true east and true west respectively.

Mercury.—At the beginning of the month will set about two hours after sunset, about 20 degrees north of true west. At the end of the month it will set only about twenty minutes after sunset.

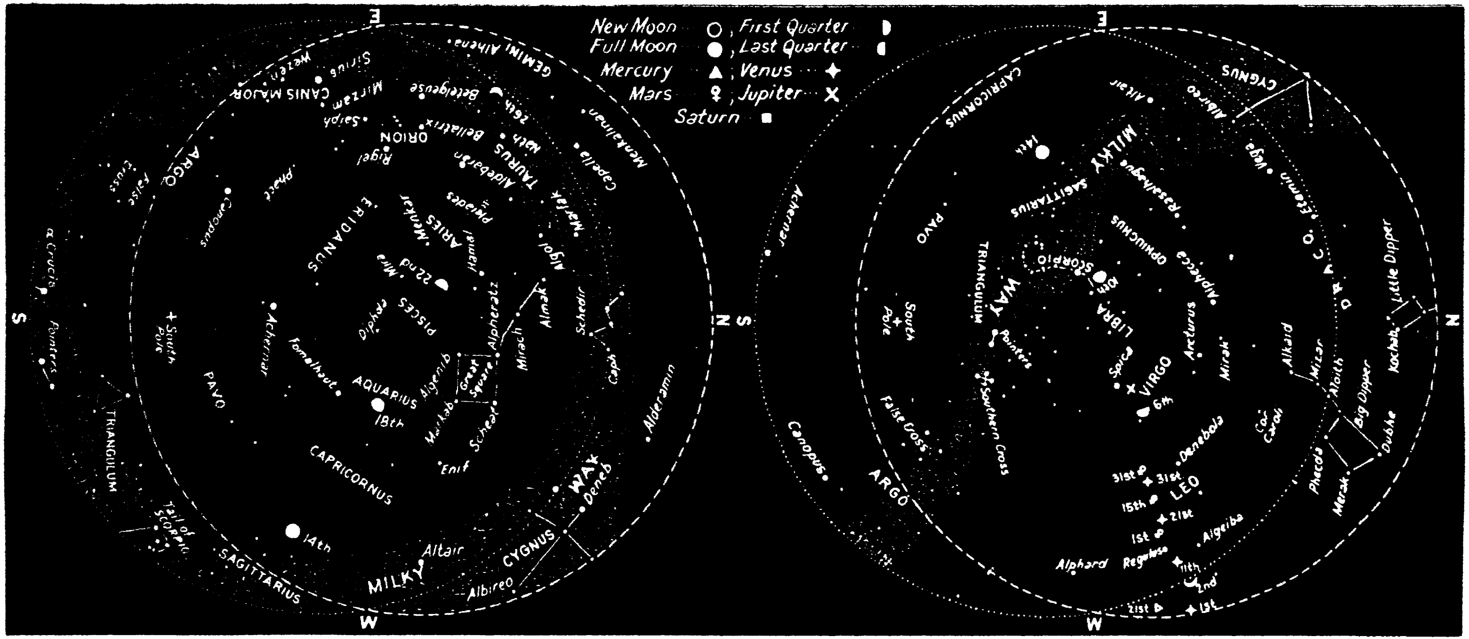
Venus.—In the constellation of Leo; at the beginning of the month will set between 7.45 p.m. and 8.45 p.m., and at the end of the month between 8.30 p.m. and 9.30 p.m.

Mars.—Also in the constellation of Leo, will set between 9.30 p.m. and 10.30 p.m. at the beginning of the month and between 8.45 and 9.45 p.m. at the end of the month.

At the end of the month Venus and Mars will be very close, Venus being the brighter.

Jupiter.—At the beginning of the month, will set a little after midnight and at the end of the month will set between 10.45 p.m. and 11.45 p.m.

Saturn.—Too close to the Sun for observation, being in line with the Sun on the 21st.



Star charts—

The chart on the right is for 7.15 p.m. in the south-east corner of Queensland to 9.15 p.m. along the Northern Territory border on July 15th. (For every degree of Longitude we go west, time increases 4 minutes.) The chart on the left is for 10 hours later. On each chart the dashed circle is the horizon at Cape York and the dotted circle is the horizon along the N.S.W. border. When facing north hold " N " to the bottom, when facing south hold " S " to the bottom, and similarly for the other directions.

Only the brightest stars are included and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus at the beginning of the month the stars will be in the positions shown about 1 hour later than the time stated for the 15th and at the end of the month about 1 hour earlier than that time. The positions of the moon and planets, which are continually changing in relation to the stars, are shown for certain marked days. When no date is marked the position is for the middle of the month.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

MAY RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	May.	No. of years' re-cords.	May., 1945.	May., 1946.		May.	No. of years' re-cords.	May., 1945.	May., 1946.
North Coast.	In.		In.	In.	*South Coast—cont'd.*	In.		In.	In.
Atherton	2·34	42	4·04	2·04	Gatton College ..	1·53	44	1·69	..
Cairns	4·51	61	8·75	4·28	Gayndah	1·55	72	0·99	0·06
Cardwell	3·64	71	4·81	1·95	Gympie	2·91	73	1·58	0·46
Cooktown	2·76	67	3·80	1·82	Kilkivan	1·85	62	0·79	Nil
Herberton	1·72	57	2·08	1·04	Maryborough ..	3·01	72	2·94	1·02
Ingham	3·76	51	5·40	2·97	Nambour	5·09	47	2·75	1·11
Innisfail	12·39	62	9·33	6·68	Nanango	1·55	61	1·59	0·27
Mossman	3·10	19	6·06	3·32	Rockhampton ..	1·60	72	1·48	0·22
Townsville	1·24	72	0·57	0·08	Woodford	3·03	55	3·16	0·46
Central Coast.					*Darling Downs.*				
Ayr	1·09	56	0·61	0·12	Dalby..	1·29	73	0·50	Nil
Bowen	1·28	72	1·77	0·99	Emu Vale	1·12	47	1·30	0·40
Charters Towers ..	0·78	61	0·38	0·05	Jimbour	1·21	64	0·83	Nil
Mackay	3·86	72	2·74	2·92	Miles	1·51	58	0·62	0·13
Proserpine	4·22	40	4·81	1·61	Stanthorpe	1·75	70	1·49	0·97
St. Lawrence ..	1·74	72	2·56	0·04	Toowoomba	2·14	71	2·00	0·17
					Warwick	1·48	78	1·90	0·41
South Coast.									
Biggenden	1·80	44	1·38	0·35	*Maranoa.*				
Bundaberg	2·63	60	2·02	0·54	Roma	1·42	69	0·06	0·05
Brisbane Bureau ..	2·77	94	2·95	0·27	St. George	1·41	62	1·31	0·02
Caboolture	3·27	67	2·72	0·20					
Childers	2·17	48	1·60	0·61	*Central Highlands.*				
Crohamhurst.. ..	5·04	50	4·00	..	Clermont	1·29	72	1·41	0·08
Esk	2·00	56	1·79	0·12	Springsure	1·23	74	0·97	Nil

CLIMATOLOGICAL TABLE FOR MAY.

(Compiled from Telegraphic Reports.)

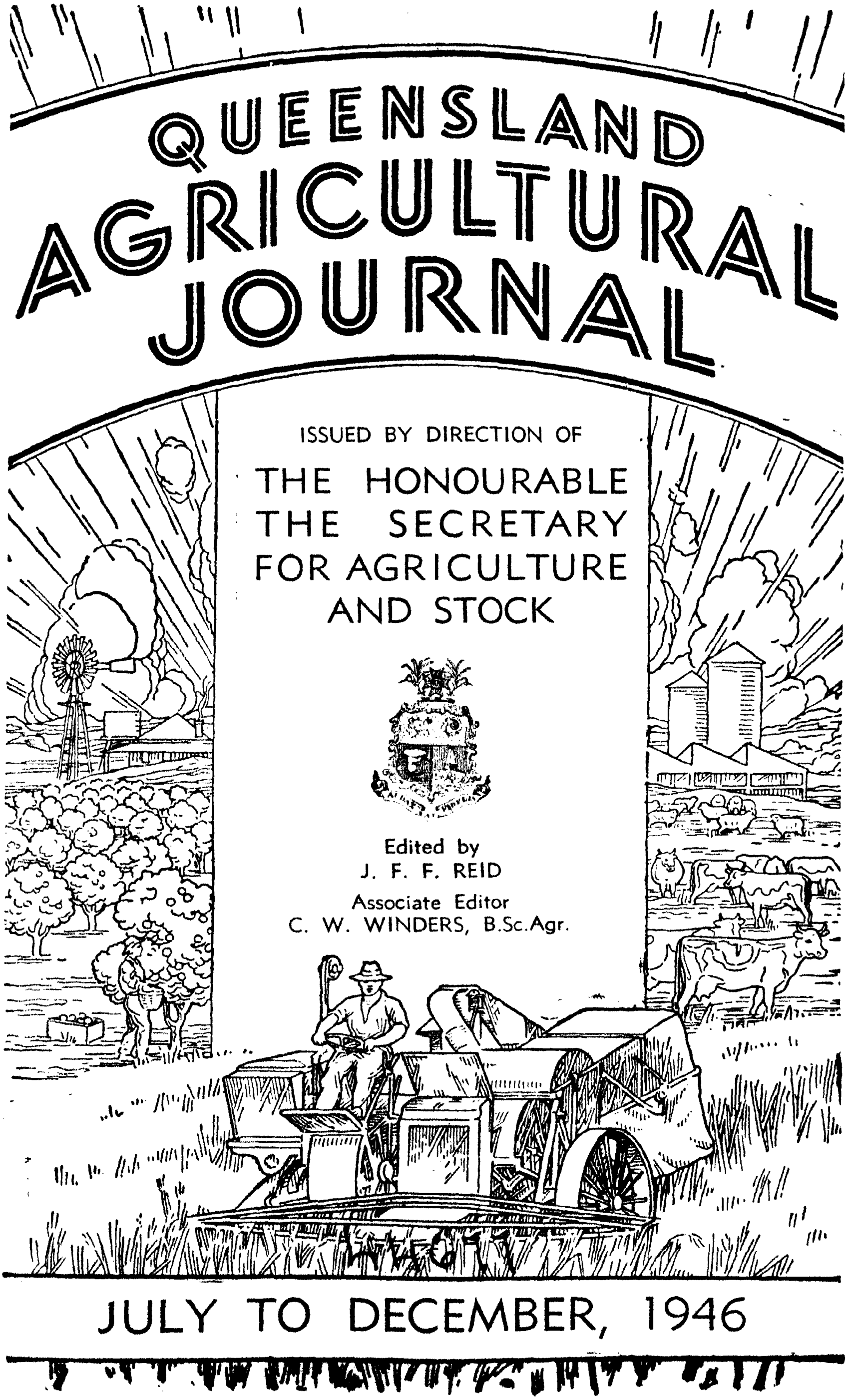
Divisions and Stations.	Atmospheric pressure Mean at 9 a.m.	SHADE TEMPERATURE.		EXTREMES OF SHADE TEMPERATURE.				RAINFALL.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Coastal.									
Cairns	..	83	67	88	6	60	21	428	13
Herberton	..	74	55	80	17, 18	31	20	104	8
Townsville	..	82	62	89	18	47	30	8	2
Rockhampton	30·11	82	57	89	2	45	21	22	2
Brisbane	30·24	76	54	83	14	46	16	27	3
Darling Downs.									
Dalby	..	76	45	82	7	33	16	Nil	..
Stanthorpe	..	68	35	74	13	19	16	97	4
Toowoomba	..	70	44	76	14	30	16	17	2
Mid-Interior.									
Georgetown	29·98	88	74	95	2	45	20	Nil	..
Longreach	30·10	86	56	95	1	42	19	Nil	..
Mitchell	30·11	77	45	83	4, 5, 25, 30	31	21	10	1
Western.									
Burketown	..	88	63	95	4	48	20	Nil	..
Boulia	30·01	88	54	91	2	43	19, 21	Nil	..
Thargomindah	30·11	78	51	87	9, 10	41	22, 31	Nil	..

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

Supplement to the "Queensland Agricultural Journal," April, 1947.

Volume 63



QUEENSLAND AGRICULTURAL JOURNAL

ISSUED BY DIRECTION OF
THE HONOURABLE
THE SECRETARY
FOR AGRICULTURE
AND STOCK

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

JULY TO DECEMBER, 1946

Vol. 63 Parts 1 to 6

QUEENSLAND AGRICULTURAL JOURNAL

GENERAL INDEX.

PAGE.

A

- Astronomical Data 62, 126-7, 190-1, 254-5, 318-9, 382-3
- Australian Farming 57

B

- Bacon Pig Competition 235-9
- Bacon Pig Description 103-8
- Bag-lifting 122, 249
- Bale Hoist 166
- Banana—
  - Board Levy 248
  - Case 56
  - Rust Thrips 83-5
- Barley Grazing 8, 140-1
- Bean Bruchid 148-50
- Beans, Canning 197-201
- Beef Bull Price 120
- Beef Industry Improvement 68
- Big Liver Disease 51-5
- Blackleg—
  - Cabbage 151-3
  - Cattle 47-50
  - Cauliflowers 151-3
- Black Rot of Cabbage and Cauliflower 151-3
- Boar Selection 298-301
- Borers in Fruit Trees 282-3
- *Brachiaria purpurascens* 263
- Brisbane Exhibition 167-84
- Brisbane Milk Board 376
- Brumby Control Order 56
- Buffalo Fly 112-6
- Burdekin Flood 336-40
- Burdekin River Trust 248
- Bushfire Hazards 196
- Butter Content of Milk 161
- Butter Market in Britain 132
- Butter Production Statistics 349-63
- Butter, Salt in 30-2
- Buttermaking 97-9

PAGE.

C

- Cabbage—
  - Diseases 151-3, 345
  - Growing 341-3
- Calf Rearing 50
- Calopo 266
- *Calopogonium mucunoides* 266
- Canary Seed Grazing 8
- Canning Bean Production 197-201
- Carrot Disease Control 345
- *Cassia alata* 150
- Cauliflower Disease Control 345
- Centro 266
- *Centrosema pubescens* 266
- Cereals for Grazing 5-8
- Chaff, Excess Moisture 185
- Cheese Production Statistics 224-7, 364
- *Chenopodium carinatum* 83
- Chick Sex Determination 40-3
- Child Welfare 59-60, 123-4, 186-7, 250-1, 313, 378-9
- *Chloris virgata* 150
- Citrus Spraying 82-3
- Codling Moth Control 86
- Contagious Bovine Pleuro-pneumonia 162-6
- Co-operative Marketing 240-7
- Copper Deficiency in Sheep 87-91
- Cotton Needs 67-8
- Cowcane 138
- Cowpeas 134-5
- Cowpea Seed Storage 148-50
- Cream Improvement 208-10
- Cream Separator Care 92-3
- Crown Rot of Peanuts 18-19

D

- Dairy Cow Feeding 94, 95-6
- Dairy Drought Assistance 119
- Dairy Industry Problems 131-2
- Dairy Manufactures in New Zealand 23-30
- Dairy Markets 377

PAGE.

Dairy Practice Changes 323
Dairy Production in New Zealand 154-60, 211-19, 284-95
Dairy Production in Queensland 324
Dairy Services 4
Dairy Water Supply 33-7
Dairymen's State Council 373-5
Datura ferox 343
Desmodium scorpiuroides 267
Devil's Fig 280-1
Dirran Curse 280
Disease Testing 248
Dolichos hosci 267
Dolomite 142-4
Drought Relief Payments 308

E

Egg Board Boundaries 308
Egg Care 247
Event and Comment—
  A Call for More Cotton 67-8
  Australian Meat in Britain 195-6
  Bush Fire Hazards 196
  Changing Dairy Practices 323-4
  Dairy Production 324
  Problems of the Dairy Industry 131-2
  Rural Development in Queensland 3-4
  Service to the Dairy Industry 4
  The British Butter Market 132
  The Demand for Good Meat 68
  The Year in Agriculture 259-60

F

False Castor Oil Plant 343
Farm Policy 21
Farrer Memorial 377
Feathertop 150
Fertilizers for Lettuce 9-10
Field Pea 141
Film Library 121
Fire Fighting 312
Fodder Conservation 58, 71-3
Fodder Crops in East-Central Queensland 133-41
Fodder Crops in Mackay District 69-73
Fodder Crops on Darling Downs 5-8
Foreign Bodies in Cow 57
Fowl Paralysis 51-5
French Millet 136

G

Giant Setaria 136
Gomphrena Weed 150
Goosefoot 283
Grape Phylloxera Proclamation 56
Grape Vine Pruning 202

H

Hairy Indigo 283
Hatcheries Registered 4-6, 109-11, 305-7
Hay Stacking 58
Herd Testing 99, 100-1, 220-2, 296-7, 290-5, 379
Hirschfeld, Dr. E. 117-8

PAGE.

I

Indigofera hirsuta 283
Irrigation of Lettuce 15-16

J

Japanese Millet 136
Josephine Burr 150

K

Kitchen Recipes 60, 124, 187, 251, 314-5, 379

L

Land Utilisation 333-5
Leaf-miner Control 204-7
Lemons—
  Colouring 271-2
  Curing 271
  Harvesting 270-1
  Packing 272-9
Lettuce—
  Disease Control 345
  Growing 9-17
Leucosis 51-5
Lucerne 133-4

M

Machinery, Affixing 307
Maize Fodder 137
Mangold 141
Maori Mite Control 346-7
Marketing, Co-operative 240-7
Mastitis Control 210
Meat in Britain 195-6
Melinis minutiflora 263-4
Milk and Cream Pasteurization 376
Milk and Health 375
Milking Shed Hygiene 234
Molasses Grass 263-4

N

Navy Bean Board 376
Navy Bean Production 197-201
Nematode Control 20-1
Neurolymphomatosis in Poultry 51-5
New Zealand Dairying 23-30, 154-60, 211-19, 284-95

O

Oats 7, 69-72, 140
Oleander 150

P

Panicum maximum 262
Papaw Latex 74-80
Para Grass 263
Passion Fruit Mite 145-7
Pastures in North Queensland 261-9
Pearl Eye 51-5
Peanut Crown Rot 18-9
Peanut Growing 325-32

PAGE.

Pigs—
  Bacon 103-8
  Feeding 57
  Management 39
  Mortalities 38-9
  Selection 298-301
  Trucking 301
Pineapple Fertilizer 129
Pineapple Water Blister Control 347
Pin-hole Borer 282-3
Pleuro-pneumonia 162-6
Poison Plant—Oleander 150
Potato Tuber Moth 81-2
Poultry—
  Advisory Board 376
  Feed Shortage 119
  Leucosis 51-5
  Sex Determination 40-3
Pueraria phaseoloides (Puero) 265
Pumpkins, Fodder 138-9

Q

Queensland Agriculture 259-60

R

Rain Gauges, Home-made 203, 345
Rape 141
Red Natal Grass 343
Rhynchelytrum repens 343
Ringworm Bush 150
Rope Saver 122
Rural Development in Queensland 3-4
Rye, Grazing 8, 141

S

Samoan Clover 267
Sarawak Bean 267
Separator Care 92-3
Shearing Tallies 310-11
Sheep, Copper Deficiency 87-91
Silage Making 72-3
Silage Unloading 58
Soil Deterioration 142-4

PAGE.

Solanum hamulosum 280
Solanum torvum 280-1
Sorghum, Saccharine 137
Sow Selection 298-301
Staff Changes and Appointments 56, 248, 308
Stallion Boards 119
Stock Crossings 248
Stock Food Standards 309
Stramonium 343
Stump Burning 279
Stylosanthes gracilis (Stylo) 266-8
Sudan Grass 71, 135-6
Sugar Levies 376

T

Tobacco Leaf-miner Control 204-7
Tobacco Nematode Control 20-1
Tomato Disease Control 344-5
Trailer Hitch Pin 249
Tuberculin Testing 185, 302-4
Twine Joining 219
Twine Threading 122

V

Vegetable Disease Control 344-5
Veterinary Medicines 365-72

W

Wasting Disease of Poultry 51-5
Water Blister Control 347
Water Conservation Investigations 37
Water Heating 219
Water on Dairy Farms 33-7
Weather Data 61-3, 125-8, 188-9, 252-3, 316-7, 380-1
Weeds—
  Feathertop 150
  Gomphrena Weed 150
  Goosefoot 283
  Josephinia Burr 150
  Stramonium 343
Wheat Grazing 5-7, 139-40
White Panicum 71, 136
Wild Life Preservation 56, 308

INDEX TO ILLUSTRATIONS

B

	PAGE.
Bag Lifter	122
Bean Bruchid	148
Bean Cutter	199, 200
Bean Harvester	200, 201
Beef Cattle Champions	228, 229
Black Rot of Cabbage	151
Brisbane Show, 1946	169-84
Buffalo Fly	113
Bungil Bay Scenes	37, 348
Burdekin Flood Damage	336-40

C

Canary Seed Pasture	8
Copper Boiler	36
Copper Deficient Wool	88, 89

D

Dairy Cattle Champions	228-34
Dam on Monto Farm	33
Devil's Fig	281
Dolomite Effects	143

E

Eungella Range Road	111

F

Float Leveller	11

G

Granadilla Scene	372
Grass Hay	335
Guinea Grass Pasture	262

H

Hereford Cattle	96, 223
Hirschfeld, Dr. E.	117

J

Japoon River Scene	17

K

Kauri Pine Logs	46, 348

L

	PAGE.
Lemon Packing	273, 275, 276, 278
Lettuce Crop	14, 15, 16
Lettuce Hilling	12
Lettuce Planting	13
Lettuce Thinning	14
Leucosis Liver	54
Lucerne, Grazing	64

M

Molasses Grass Pasture	264

N

Navy Bean Crop	161

O

Oat Crop	70, 71 ,73

P

Papaw Latex Collection	75-80
Para Grass Pasture	268
Paralysed Fowl	52
Passion Fruit Mite	146, 147
Peanut Crop	326,327
Peanut Curing	330
Peanut Harvesting	328,329
Peanut Silos	332
Peanut Threshing	331
Pearl-eye of Fowl	53
Pigs, Bacon	104-7, 237-9
Pig Types	298-300
Pumpkin, Cattle	139

R

Rain Gauge	203

S

Scrub Burn	22
Scuffler	12
Stacker	58
Sudan Grass Crop	135

T

Tanks, Underground	35
Tobacco Leaf-miner	205-6

W

Water Troughs	34
West Palmerston Scene	22, 144
Wheat Grazing	6

AUTHOR INDEX.

PAGE.

A

ABERDEEN, J. E. C.—
  Seasonal Notes on the Control of Vegetable Diseases 344-5

AGNEW, G. W. J.—
  Papaw Latex Production in Queensland 74-80

B

BLACKFORD, F. W.—
  Black Rot and Black Leg of Cabbage and Cauliflower 151-3
  The Spring Spray Programme in the Citrus Orchard 82-3

BOSTOCK, F.—
  Export Baconer Pigs. Brisbane Royal National Show, 1946 235-9
  Mortality in Pigs 38-9
  Points in Piggery Management 39
  The Bacon Pig 103-8

BURGESS, L. A.—
  Determination of Salt in Butter 30-2

C

CALDWELL, N. E. H.—
  Control of the Banana Rust Thrips 83-5
  D.D.T. and Codling Moth Control 86
  Pin-hole Borers in Deciduous Fruit Trees 282-3
  The Potato Tuber Moth and D.D.T. 81-2

CANNON, R. C.—
  Control of Nematodes in Tobacco Seed-beds 20-1
  Control of the Leaf-miner in Tobacco 204-5
  Protection of Stored Cowpea Seed against Insect Damage 148-50

CLAY, A. L.—
  The Tuberculin Test 302-4

CLYDESDALE, C. S.—
  Grazing Winter Cereals on the Darling Downs 5-8

COLEMAN, F. B.—
  Veterinary Medicines 365-72

COLEMAN, F. C.—
  How Butter is Made 97-9

G

GOODCHILD, N. E.—
  Fodder Crops in the Mackay District 69-73

GRAHAM, T. G.—
  Grassland Development in Tropical Coastal Areas 261-9

H

HASSELL, O. L.—
  Dairy Fodder Crops in East-Central Queensland 133-41

HUNTER, H. S.—
  Co-operative Marketing in Queensland 240-7
  The Dairymen's State Council 373-5

PAGE.

J

JARDINE, F. L.—
  Summer Pruning of Grape Vines 202-3

K

KELLY, T. K.—
  Feeding the Cow before Calving 94

KERR, J. A.—
  Canning or Navy Bean Production in Queensland 197-201
  Peanut-growing 325-32

M

MANNING, C.—
  Sex Determination of Day-old Chickens 40-3

MAY, A. W. S.—
  Maori Mite Control in Midsummer 346-7

MCKNIGHT, T.—
  Losses from Water Blister can be Avoided 347

MELVILLE, E. L.—
  Selection of the Boar and Sow 298-301

MORGAN, C. N.—
  Cabbage-growing 341-3
  Lettuce-growing 9-17

MORWOOD, R. B.—
  Peanut Crown Rot 18-19

MOULE, G. R.—
  Copper Deficiency of Sheep in Queensland 87-91

MULHEARN, C. R.—
  Contagious Bovine Pleuro-pneumonia 162-6

N

NEWTON, L. G.—
  Leucosis in Poultry. Paralysis, Big Liver, Wasting and Pearl-eye Diseases 51-5

P

PEGG, S. E. (with C. R. Tummon)—
  Low Butter Content of Late Winter Milk 161

R

RICE, E. B.—
  Milking Shed Hygiene 284
  Observations on Dairy Manufactures in New Zealand 23-30
  Observations on Dairy Production in New Zealand 154-60, 211-9, 284-95
  Queensland Cheese Production, 1945-46 224-7, 364

ROBERTS, F. H. S.—
  The Buffalo Fly 112-6

ROBERTSON, D. S.—
  Water on the Dairy Farm 33

PAGE.

S

SKERMAN, P. J.—
Land Utilization 333-5

SLOAN, W. J. S.—
Passion Fruit Mite 145-7
The 1946 Burdekin Flood 336-40

SMYTHE, V. R.—
Improvement of Cream Grades 208-10

SUTHERLAND, A. K.—
Blackleg in Cattle 47-50

SUTHERLAND, E.—
The Care of the Cream Separator 92-3

PAGE.

T

TUMMON, C. R. (with S. E. Pegg)—
Low Butter Content of Late Winter Milk 161

W

WHITE, C. T.—
Dr. Eugen Hirschfeld. An Appreciation 117-8
The Devil's Fig 280-1

WILLIAMS, C. G.—
Harvesting and Packing Lemons 270-9

WILSON, G. L.—
Deterioration of Unlimited Vegetable Soils 142-4

A. H. TUCKER, Government Printer, Brisbane.

Volume 63 Part 1

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

JULY, 1946

Issued by Direction of
THE HONOURABLE H. H. COLLINS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

PAGE.

Event and Comment—

Rural Development in Queensland .. 3
Service to the Dairy Industry .. 4

Field Crops—

Grazing Winter Cereals on the Darling Downs 5

Vegetable Production—

Lettuce-growing 9

Plant Protection—

Peanut Crown Rot 18
Control of Nematodes in Tobacco Seed-beds 20

The Dairy Industry—

Observations on Dairy Manufactures in New Zealand 23
Determination of Salt in Butter .. 30
Water on the Dairy Farm 33

The Pig Farm—

Mortality in Pigs 38
Points in Piggery Management .. 39

The Poultry Farm—

Sex Determination of Day-old Chickens 40
Registered Hatcheries 44

Animal Health—

Blackleg in Cattle 47
Leucosis in Poultry 51

PAGE.

General Notes—

Staff Changes and Appointments .. 56
Use of Term "Co-operative" .. 56
Phylloxera in Grapes 56
Control of Brumbies 56
Elections of Commodity Boards .. 56
New Banana Case 56
Wild Life Preservation 56
Peanut Board 56

Rural Topics—

The Australian Farmer—Mr. Bankes Amery's Tribute 57
"Iron Rations" Not Good for Dairy Cows 57
No Runts Among the Grunts .. 57

Gadgets and Wrinkles—

Automatic Unloading .. . 58
A Useful Automatic Roll-in Stacker .. 58

The Farm Home—

Care of Sick Children . 59
In the Farm Kitchen 60
Queensland Weather in June .. 61
Astronomical Data for Queensland 62
Rainfall in the Agricultural Districts 63
Climatological Data for May 63

STATE'S SEEDS ARE GOVERNMENT TESTED

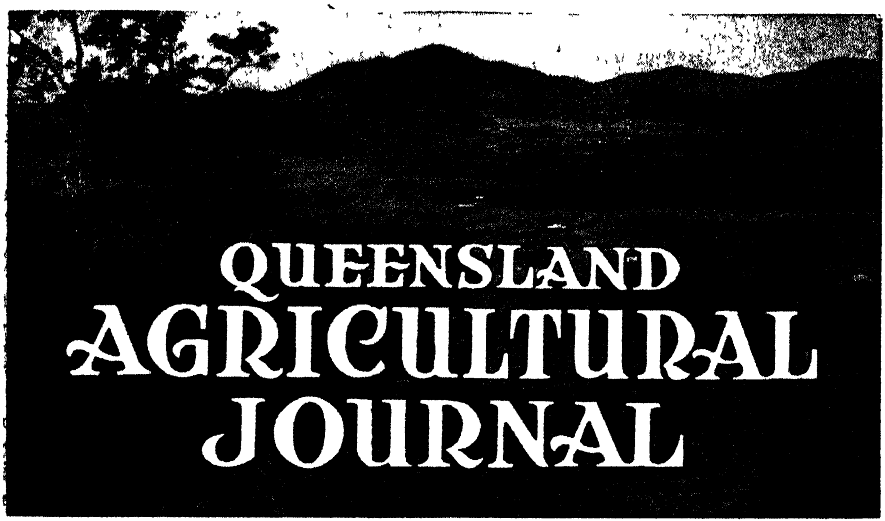
	Bushel s.	d.
BEANS—Brown Beautys ..	70	0
BEANS—Canadian Wonders	82	6
BLUE LUPINS, N.Z. ..	13	6
DUN FIELD PEAS ..	15	0
SEED BARLEY	6	6
	lb.	
PUMPKINS—Beaudesert ..	5	0
PUMPKINS—Cattle ..	2	6
RAPE—Dwarf Essex ..	1	1
RAPE—Giant Kangaroo ..	1	2

ASK FOR YOUR REQUIREMENTS

SEED POTATOES
Brownells, Factors, Carmens, and Certified Factors
Delivery When Required
ORDER NOW

State Produce Agency Pty. Ltd.
ROMA STREET BRISBANE

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Volume 63 1 JULY, 1946 Part 1

Event and Comment.

Rural Development in Queensland.

MANY new measures for the further development of rural industries in Queensland are projected and some are already in the effective stage. Regional experiment stations are in process of establishment in important agricultural centres. At the old-established station at Biloela activities are being extended further into the field of general agriculture and it is planned to include facilities for work in animal husbandry, particularly dairying and pig raising.

The departmental property at the Hermitage, near Warwick, has been reopened and there attention will be given to problems of wheat, grain sorghum, and maize production. Experimental work on soil conservation methods will be done, and pasture plants also will be under trial. All these lines of investigation should be of great value eventually to farmers of the Darling Downs and neighbouring districts. It is expected that problems of dairying, piggery management, and lamb raising will likewise be studied at this station. A horticultural experiment station has been established near Nambour, at which problems of fruit production are under investigation.

In the Far North, the departmental property at Kairi, too, will become a centre for general experimental work, particularly on maize, lucerne, and pasture problems. Attention also will be given to various branches of animal husbandry and other matters of especial interest to the farmers of the Atherton Tableland and contiguous territory.

Crops new to Queensland are under investigation. The Director of Agriculture is at present in the United States of America inquiring into various aspects of primary industry, giving special attention to soy bean varieties, their characteristics and cultivation. It is probable that as a result of this mission the soy bean will eventually become an important factor in our agricultural economy.

Linlithgow Library.

In view of the large home market for cotton, consideration also is being given to the expansion of acreage under this crop. It is anticipated that the requirements of Australian cotton mills will aggregate not less than 120,000 bales of the raw cotton in the course of the coming year. The extent to which Queensland growers can supply this market is, however, dependent on the degree of financial stability which the Commonwealth is prepared to give this industry.

Through the agency of the Secondary Industries Development Committee in association with the Department of Agriculture and Stock, the Committee of Direction of Fruit Marketing is being strongly supported in the furtherance of a projected modern cannery for the processing of pineapples. On present indications this cannery should be in operation early in 1947 on what is expected to be a record summer pack.

Service to the Dairy Industry.

THROUGHOUT the dairying districts of the State field officers of the Division of Dairying are available to advise dairy farmers on technical and other matters relating to their industry. Emphasis is placed more on advisory and extension service than on routine inspection. Increase in output and the maintenance or improvement of quality standards are the main objectives.

A dairy machinery advisory service is now well established, and field demonstrations and farm visits are arranged according to schedule. The efficient operation and care of milking and separating plants have obviously a direct bearing on the quality of the product. Well equipped laboratories at Brisbane and Toowoomba staffed with highly-trained technologists carry on research, as well as specialized practical work

A herd-testing service, entirely free to the farmer, is being maintained. Under this departmental system samples are received for determination of butterfat content, records are compiled and results passed on to the farmer. Consideration is being given to the making of this recording system more effective by providing for the setting up of herd testing units consisting of 25 neighbouring farms, and for each unit to have the services of a full-time tester to weigh, sample, test, and compile herd records for the co-operating farmers. To assist in the breeding of better stock by ensuring the availability of an adequate number of pure-bred sires of proven production ancestry, the Department also provides an advanced register testing service for dairy societies without charge to stock breeders. As an added inducement for herd improvement, buyers of pure-bred bulls are allowed rail transport rebates. Taking a long view, the Department initiated a scheme some time ago for the purchase of young dairy cattle for the stocking of dairy farms taken up by ex-Servicemen who are thus assured of the availability of sound foundation stock.

A strongly-staffed veterinary service is being built up by the Department. The Division of Animal Industry provides for research work as well as for practical field service to stockowners throughout the State. Boundaries of five divisions have been fixed, each in charge of a divisional veterinary officer who, through his district officers, controls the activities of the field staff—veterinary officers, advisers, and inspectors—within the divisional area. All matters pertaining to animal health, husbandry, and breeding come within the scope of the departmental services to the agricultural and pastoral industries.

Field Crops

Grazing Winter Cereals on the Darling Downs.

C. S. CLYDESDALE, Senior Adviser in Agriculture.

THE permanent pastures on the Darling Downs, whether they are native grasses or introduced species such as Rhodes grass, mature in late summer and have a very low feeding value during the winter and spring months. There is little prospect of improving the position to the extent of establishing permanent pastures capable of providing nutritious grazing during the winter and spring. This is so, because the rainfall between April and the end of September is usually insufficient to maintain pastures in production, and no extensive irrigation is possible. Under the circumstances, stock owners must rely on annual crops for winter grazing and these crops are usually reliable if sown on land which has been prepared early and carefully. Wheat, oats, canary seed, barley and rye are popular crops for winter grazing on the Downs. In many cases such crops are sown solely for grazing, but in addition, a good deal of pasturage is provided by early grazing of crops which are intended for grain—the latter is common practice, particularly with wheat and canary seed.

WHEAT.

This is one of the most popular cereals for winter grazing on the Downs. It is extremely palatable and highly nutritious and grows very well in a normal season on most of the local soils.

There are three methods of using wheat for grazing purposes:—

(1) Grazing back a crop which is growing too rapidly and so likely to lodge or be injured by frost.

(2) Grazing only in the early stages of growth—the crop being planted primarily for grain.

(3) Grazing at intervals throughout the whole of the growing period.

Preparation of Soil.

Land intended for sowing to wheat for grazing should receive the the same treatment as that necessary for land on which it is intended to grow grain only. A summer fallow is essential in order to conserve much of the summer rainfall, as it is the stored rainfall which normally provides most of the moisture requirements of the wheat crop. The land should be ploughed or sundercut early in the summer to a depth of 3 to 5 inches and allowed to lie in the rough state for a few weeks so that it will break down well on harrowing. Weeds should be destroyed periodically during the fallowing period by harrowing; this operation will also prevent a hard crust from forming and maintain the desired soil mulch

The widespread evidence of soil erosion should be sufficient warning to farmers of the danger of using hillsides or other sloping land for winter crops which require a summer fallow.

Suitable Varieties.

When it is intended to plant wheat for grazing only, or for grazing in the early stage of a grain crop, the choice of varieties is limited to those which mature fairly slowly. Such varieties producing large amounts of greenstuff are Cleveland, Currawa, Ford, and Warput. Currawa has been popular as a grazing wheat for many years, but as the grain is subject to dockage because of its low milling quality this variety cannot be recommended for use unless it is to be grown solely for grazing purposes.

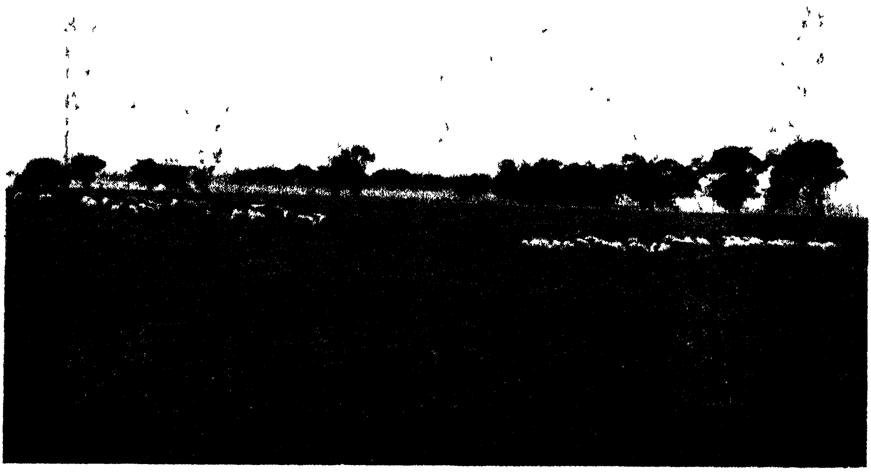


Plate 1.
SHEEP ON WHEAT, JIMBOUR PLAIN.

Cleveland is particularly suitable for green feed and grazing on the heavy black soils, such as those of the Pittsworth district. It can be sown as early as the beginning of March. Currawa does best in the higher rainfall areas of the Downs. It also can be sown in March Ford is satisfactory in a wide range of districts and Warput also is useful in many areas. Both may be sown from April to the middle of May. Where grazing is an important feature on the farm, a succession of plantings from early March to mid-May should be arranged.

Sowing.

Drilling the seed is preferable to broadcast sowing; as it not only makes a good strike more certain but also is more economical of seed. Where 45 lb. of drilled seed will produce a good stand, at least 60 lb. are required if broadcast. About 2 inches is a satisfactory depth at which to plant the seed. With a drill, it is a simple matter to ensure that seed is sown to this depth, but when broadcast seed is harrowed in the depth of soil covering is likely to vary considerably.

Grazing.

On the self-mulching types of Downs soils young wheat plants are easily pulled out by sheep and cattle. Therefore, grazing should not be commenced until the plants are firmly rooted. This will be about six to eight weeks after planting, when the crop is about 6 inches tall. A crop sown for grazing purposes can then be fed off at intervals until September or October.

Stock should not be grazed later than July on crops intended for grain. The time to cease grazing is before the developing heads, which are hidden within the leaves, are high enough from the ground to be eaten off by the stock. This should be checked by examining a number of plants for developing ears. An even grazing of the crop should be effected at each grazing period, otherwise uneven development of the grain crop may occur. A rapid feeding-off with a large number of animals is preferable to an extended grazing by a small herd or flock.

OATS.

This is the most popular winter grazing crop for dairy cattle on the Darling Downs and is used also for sheep and beef cattle. It is grown on a greater diversity of soil types than the other winter cereals. Sown early on well-prepared land, in which adequate moisture has been conserved, this crop produces a very large amount of green fodder and can be grazed up to five times during a season prior to allowing the crop to go for hay or grain.

Preparation of Soil and Sowing.

As for wheat, early preparation of the land for oats is essential and sufficient workings must be given to produce a good tilth. Sowings may be carried out from February to mid-June and the seed is preferably drilled in to a depth of about 2 inches. A useful method to employ when sowing broadcast is to make the final working with a tine cultivator, leaving the surface slightly ridged, and after sowing run a light harrow across the field, to cover the seed lying in the grooves. A sowing rate of about 40 lb. per acre is used for drilled seed and 60-70 lb. for broadcast seed.

Suitable Varieties.

The dry period usually experienced in early spring is a critical one for the oat crop, most late-maturing varieties suffering severely at this time unless planted very early. Algerian is the most widely used late-maturing variety. It should be sown from February to April and will in normal seasons then provide grazing through the dry spring period. This variety is not particularly palatable and has the additional disadvantage of being fairly susceptible to rust.

Of the early-maturing varieties, Fulghum and Belar are widely used for April to June planting. Fulghum has very marked powers of recovery after grazing and this feature, together with its good tillering ability, makes it an excellent grazing oat. It is, however, commonly rusted. Belar tillers less freely than Fulghum. Various varieties and crosses are now under test on the Darling Downs and promise is shown by some of them.

BARLEY.

The use of barley as a grazing crop should be restricted to the more fertile soils, as the soils of lower fertility will not grow this crop satisfactorily. Early preparation of land is essential for best results and the soil should be well worked to provide a good seedbed.

The main feature of barley for grazing purposes is its ability to produce early feed, but it has a relatively weak root system and is liable to be pulled out by grazing stock. Sown in March or April at the rate of 45-60 lb. per acre drilled and 75 lb. per acre broadcast, varieties such as Cape and Skinless will, under favourable conditions, provide a succession of heavy grazings for several months. If grain is desired, only one or two grazings are permissible

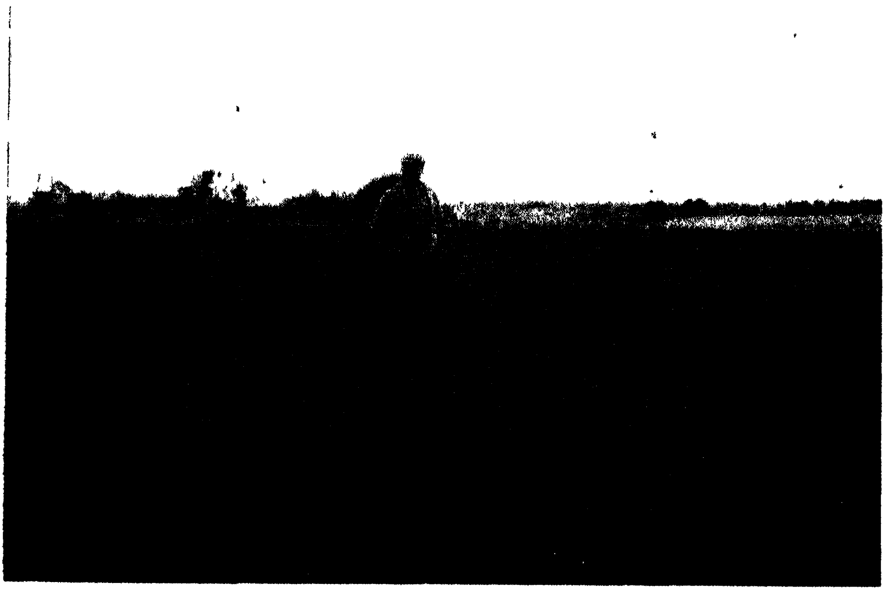


Plate 2.
SOWN PASTURE, DARLING DOWNS.

RYE.

Rye is used to a small extent for winter and spring grazing on the Downs. It is preferable to the other cereals for the poorer soil types, but here again early and adequate soil preparation is necessary. The sowing rate is from 40 lb. to 60 lb. per acre, according to the method of planting. Should the crop go to seed and the grain become infected with ergots—black, hornlike growths—the stock should be taken off, as these ergots are poisonous.

CANARY SEED.

Although canary seed is usually grown for grain, an appreciable acreage is sown each year for grazing purposes. Like barley, canary seed is fairly readily pulled out by grazing stock. It should be sown only on fertile soils, and for grazing purposes preferably in March or April. When drilled in to a fairly shallow depth, about 8-10 lb. of seed is ample.

VEGETABLE PRODUCTION

Lettuce-growing.*

C. N. MORGAN, Fruit Branch.

LETTUCE during the last few years has become one of the major vegetable crops of districts adjacent to Brisbane. Until recent times the main sources of supply were Chinese market gardens which were chiefly situated in low-lying alluvial ground adjacent to swamps or small creeks near the cities and various large towns.

With the increase in demand, growers with reliable irrigation and with various types of soil experimented with small areas until they found methods and varieties to enable them to produce good quality lettuce all the year round.

The introduction of the Imperial strains of lettuce produced by the late Dr. Jagger of the United States Department of Agriculture has done much to establish the industry in this State. They have shown considerable disease resistance and have stood up to the varying climatic conditions much better than the older varieties. The large well-formed heads of these types are particularly popular on the Queensland market.

Climate and Soil.

Generally speaking, lettuce are grown more successfully during the cooler months of the year, and although affected by heavy frosts this condition is rarely a source of worry in the Queensland lettuce producing districts. Under certain conditions, however, it is grown all the year round, the chief factors in the warmer months being reliable and constant irrigation and the use of a suitable variety. During the summer the plants do not produce a distinct heart as they do in the winter, and although the heads are large they would be classed as loose-leaved. In the warmer weather, unless grown quickly, the lettuce will rapidly run to seed. Almost any well-drained soil, providing it is supplied with adequate moisture and plant food, will grow good lettuce. Different methods of growing may be necessary, such as the hilling up of heavy soils to ensure drainage, particularly during the periods of excessive rains.

Manures and Fertilizers.

As lettuce are heavy feeders it is necessary to ensure that the soil is well supplied with plant food. A number of large growers are fortunate enough to have ample supplies of farmyard manure which is particularly suitable for lettuce and aids in the supply of organic matter without which the growing of lettuce is difficult. Unfortunately, the manure is not available for all growers and therefore the use of commercial fertilizers has become extensive.

---

*Reprinted from the *Journal* for November, 1943, in response to repeated requests from readers.

The main fertilizer used is blood and bone, which is applied to the ground a week or so prior to planting. Although various methods of application are employed a number of successful growers broadcast the fertilizer and plough or cultivate it in. Where rotary hoes are in use they prove a reliable means of incorporating manure or fertilizer with the soil. Amounts used vary according to soil requirements and usually from ten (10) cwt. to fifteen (15) cwt. per acre has proved sufficient. During growth, top dressing of the growing crop is often necessary and nitrogenous fertilizers are the most satisfactory. Sulphate of ammonia, nirate of soda or dried blood are all used, depending on the grower's particular fancy. Two applications are usually considered necessary, but in some cases one is sufficient when a heavy base dressing of fertilizer or manure has been used. The first top dressing may be done soon after thinning, and the second a little later, when the plants are nearly half grown. Top dressing should not be done when the plants are hearting or in the summer, when nearing maturity, as it tends to produce loose heads. When applying the top dressing the fertilizer should not be allowed to drop on the leaves as it may mark them, and as a precaution after top dressing it is a good practice to water, to wash off any fertilizer that may have fallen on the leaves. The total amount of top dressing should not exceed four hundred (400) lb. per acre.

Following constant use of sulphate of ammonia and manures, liming of the ground is often necessary but should not be overdone. It is commonly considered that large quantities of lime are required for successful lettuce-growing, but on many types of soil, excessive liming is not of any advantage and may even have a retarding action on growth. However, it is necessary on soils with a highly acid reaction, when good results will follow. Certain cases have been encountered where lettuce on soils of high acidity would not grow and showed many stunted and yellow patches, but when grown on the same soil after liming, have shown considerable improvement. A slightly acid soil is probably the best and, therefore, if growers should be doubtful as to their soil condition, a sample should be sent to this Department, where it will be tested for acidity and the correct amount of lime needed to correct any excess will be advised.

Rotation.

Rotating lettuce with other types of vegetables is advised, but due to the position and extent of the most suitable land this is not always possible.

A number of farmers are constantly growing lettuce on the same ground successfully, with no apparent ill effects. In most such instances, however, these growers have available large quantities of farmyard manure which keeps the soil in good condition, replacing in it the materials, particularly organic matter, which are apt to be depleted. In soils that are at all heavy constant watering tends to make the soil organisms inactive, and a rotation with a crop not so exacting in its water requirements allows the soil a chance to dry out partially. Rotation is also advisable to aid efficient control of disease. Green manure crops as a means of improving soil condition are recommended, particularly where growers do not use farmyard manure.

Soil Preparation.

All land for lettuce, whether heavy or of a sandy nature, must be thoroughly prepared. Two, and on certain types of soil three, ploughings are necessary, followed by harrowing and cultivating until such time as the soil is in a fine state of tilth. The sandy loams are much easier to prepare than the heavy clay loams. When planting direct into the field it is essential to have the land as level as possible and free of lumps, and this can be brought about by the use of a float. This float (Plates 3 and 4) is easily made out of weather boards approximately 3 feet long nailed across two strong supports, the thick portion of the board overlapping the preceding narrow portion about ¾ inch. The length of the float may be approximately 4 feet and a chain for pulling attached to the front of the supports so that the thick edges of the planks are drawn against the lumps.

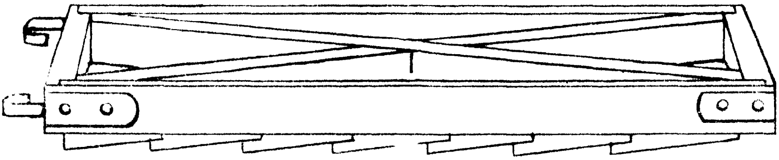


Plate 3.

Wooden Float.—Note placing of weather boards to act as levellers.

Growers may modify the above sizes to suit their particular requirements. With two horses the size may be increased accordingly and should be sufficiently wide to fill in the hoof marks. Diagonal stays help to make the float more rigid. The driver may stand on the float, supplying any additional weight required.

Planting.

Before the general use of small mechanical seed planters and irrigation, it was customary to grow the lettuce seed in beds and trans-

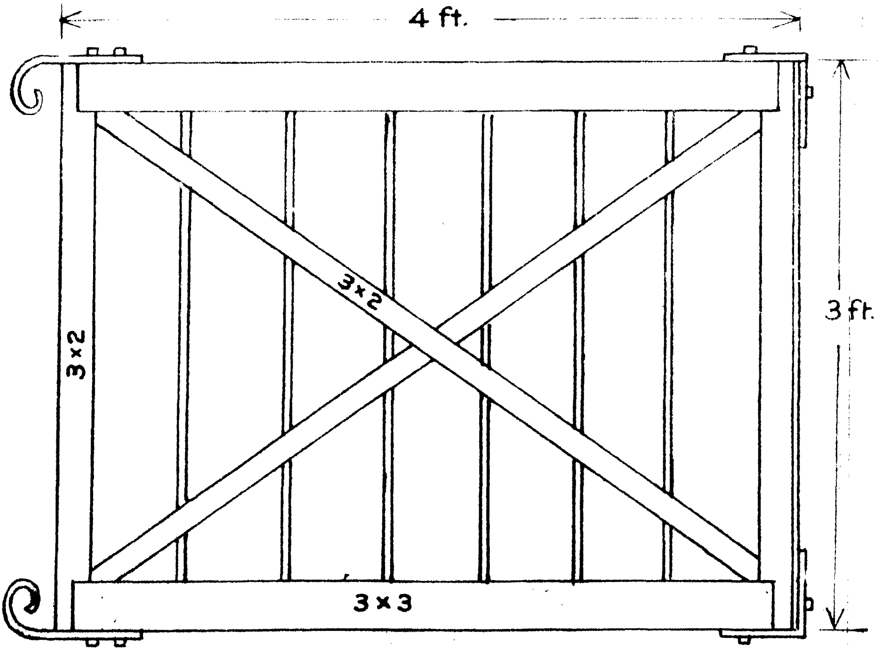


Plate 4.

Top View of Float.—Plan showing method of strengthening.

plant to the field. Owing to losses in transplanting and the tedious work this practice has been largely replaced by planting seed direct into the field.

Plate 5.

SCUFFLER WITH "HILLER" ATTACHED TO REAR FOOT.

Plate 6.

"HILLER" FOR ATTACHING TO SCUFFLER.

Two methods of planting are usually adopted. The first is to plant on to raised beds sufficiently wide to allow four rows approximately 12 inches to 15 inches apart. The method of making the beds is to throw in two furrows approximately 6 feet apart, either by means of a single furrow plough or a hiller attached to a cultivator, as illustrated in Plates 5 and 6. The latter method is simpler and quicker. The beds may then be levelled by raking or by a float. The method of raising the beds is employed on heavy or shallow soils to improve the drainage (Plate 7).

The second system is to plant direct in the field without hilling, and is employed on the well-drained sandy types of soil (Plate 8). Rows are made about 15 inches apart, and this distance allows the use of a hand cultivator. Should horse cultivation be contemplated, which is most unlikely, rows will have to be up to 2 feet apart.

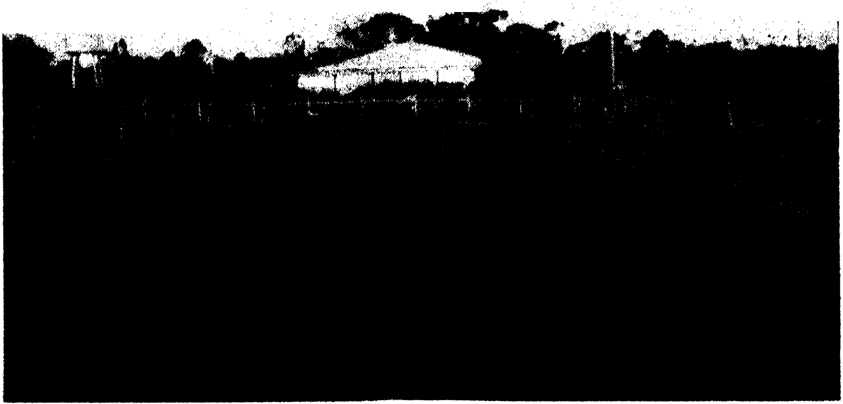


Plate 7.

SOIL HILLED UP READY FOR LEVELLING.

Plate 8.

LETTUCE PLANTED ON THE FLAT.—Recommended only for naturally well drained soils.

With both methods the seed is drilled out so that it is dropped continuously along the row and must be sown shallow. Thick seeding should be avoided as the work involved in thinning is laborious and expensive and much seed is wasted. From 1 to 1½ lb. of good seed should be sufficient to plant an acre when using a planter (Plate 9),

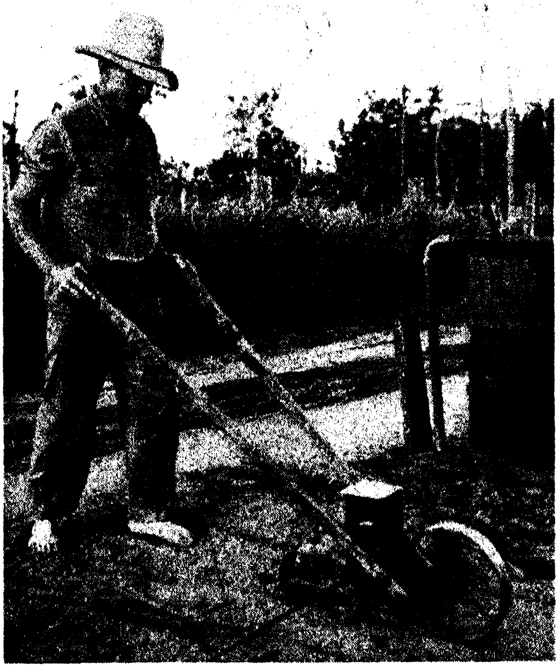


Plate 9.

MECHANICAL PLANTER.—Controls distance and depth when planting seed, also marks distance apart of rows with adjustable arm projecting from right of machine.

more being required when planting by hand. If there is any doubt of the seed or conditions affecting germination as much as 2 lb. is not excessive. Successive plantings may be done of areas large enough to conveniently handle at periods of approximately seven days apart. Lettuce usually take from eight to ten weeks from seed to reach market condition, depending on the time of the year and climatic conditions.

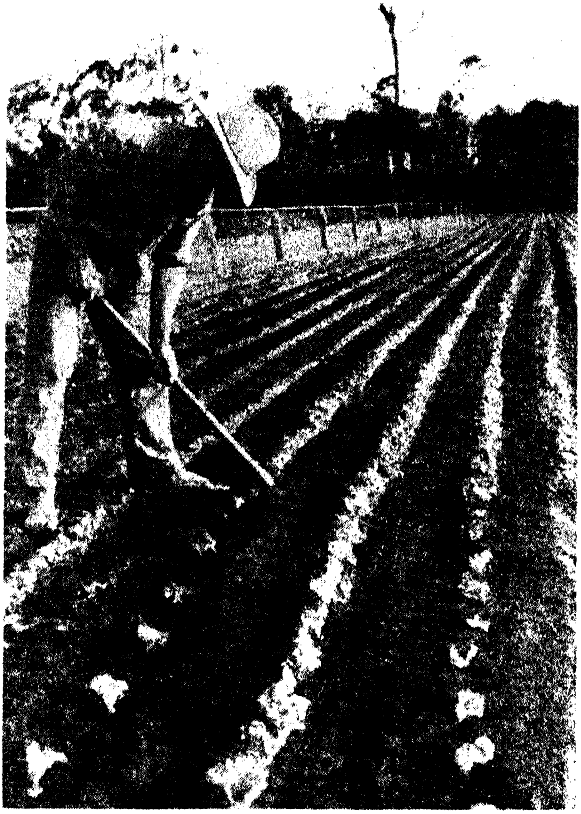


Plate 10.

THINNING YOUNG LETTUCE WITH A SMALL HOE.—Notice the unthinned row in the centre.

Thinning.

Approximately three to five weeks after planting, depending on location and time of year, the plants should be large enough to thin out. They are usually thinned to about 9 to 10 inches apart. This can be done by hand or with a small hoe (Plate 10). The latter method is effective, and with practice the grower becomes most skilful. Obviously, with the use of the hoe, many small clumps will be left at each required distance and these may then be thinned by hand. Should there be any misses in the row, they may be filled in by some of the thinned plants.

Cultivation.

Cultivation should be fairly constant and in no instance should weeds be allowed to get too big, as the lettuce is a shallow-rooted plant, and great injury will result in the removal of big weeds. Small hand cultivators may be used to keep down weeds between the rows. In the rows chipping is necessary; if the lettuce are grown quickly, two chippings should be all that is required. One is usually done at thinning and the other a few weeks later. Cultivation should be fairly continuous, but never too deep. During cultivation is usually a satisfactory time for top dressing as the fertilizer is then worked into the soil.

Plate 11.

LETTUCE HALF-GROWN.—Planted 12 inches by 10 inches on raised beds. This area is irrigated with an overhead system.

Irrigation.

Practically all lettuce are irrigated by overhead sprays, and this method is quite satisfactory (Plate 11). If the ground is fairly dry it is advisable to water well a few days prior to sowing. After sowing, the ground should again be watered and then kept moist until the plants are through. Lettuce requires a plentiful supply of water, particularly during the warmer months, when evaporation and transpiration are high. Lack of moisture results in stunting and slow growth of the plants, and in the warmer weather causes them to run to seed prematurely. Soil and climatic conditions have a bearing on any set programmes of watering, and therefore no hard and fast rule can be laid down to cover the various types of soils, but all must be kept moist by regular waterings.

Saturation of soils is undesirable and should be carefully avoided, as far as practicable. This condition often occurs during the rainy periods and irrigation must be carefully planned in an endeavour to avoid watering heavily when heavy rain is likely. During the winter months irrigation is done sparingly, and normally no great effort on the part of the grower is required to keep an even supply of soil moisture during this period. In the summer, however, the position is quite different, and full use of irrigation facilities is necessary.

The well-drained sandy and volcanic soils require much more irrigating than the heavier ones. With the former types it will commonly be necessary to water thoroughly every second or third day. When the longer interval is employed, it will be to advantage to give light waterings in between to keep the soil in as cool a condition as possible. On the heavy soils, one good watering, followed by two light waterings each week should be sufficient. Modifications of any programme may be necessary, of course, with any sudden change in climatic conditions, and growers should not blindly follow any particular practice merely because good results followed it in a former season.

Over head watering during the heat of the day is not recommended and it should be done early in the morning or at night. As the heads reach maturity and the plants spread between the rows they shade the ground and thereby lessen evaporation, with the result that they are not in need of such consistent watering as they were in their earlier stages. Therefore, should a grower find his irrigation supply likely to be slightly below his requirements, losses will be far less probable in lessening the water on the near-mature plants than half-grown ones.

Plate 12.
LETTUCE READY TO HARVEST.

Harvesting.

Lettuce should be harvested as soon as they have reached maturity (Plate 12). If allowed to remain they rapidly become bitter and unpalatable. Winter lettuce are mature when the hearts are firm, and if picked before this do not keep or travel satisfactorily. Summer lettuce, being loose-leaved, may be cut when they reach reasonable market size. In an endeavour to obtain large lettuce in the summer care must be taken to see that they do not start to run to seed, for when this occurs they are commercially valueless. Harvesting extends over a period of days, as it would be a rare case to have all the lettuce from the same planting ready within a day or so of each other. Cutting is done either late in the afternoon of the previous day or early on the morning of the day of marketing. The former practice is quite satisfactory in the winter, while the latter is more desirable in summer. A pamphlet on lettuce packing for market is procurable on application to this Department.

Varieties.

The most popular varieties are the crisp, curly-leaved lettuce. Various varieties are grown, but the most satisfactory at present are: —

Imperial 847.—This variety is by far the most popular and may be grown in most localities all the year round.

Imperial 615.—This variety is grown to some extent in the winter and is a particularly good lettuce. It is not recommended for the warmer weather.

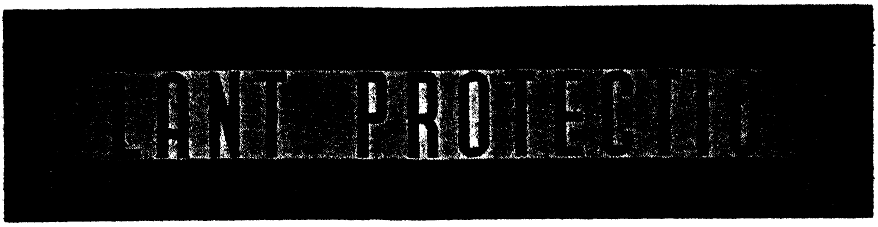
New York.—This variety is still grown in some localities for the winter, but has been replaced by Imperial 847 for the warmer months.

Seedless.—This variety is popular with a number of growers during the hot months of the year. It is lighter in colour than most of the above varieties but is large and is in good demand.

Mignonette.—A small variety of good flavour, and is recommended for home gardens. It is not a market variety, being too small, but will grow well at any time of the year.

Plate 13.

THE RIVER NEAR JAPOON, NORTH QUEENSLAND.



Peanut Crown Rot.

R. B. MORWOOD, Pathologist.

Symptoms.

CROWN rot is a disease which is frequently responsible for poor stands of peanuts, particularly in the Virginia Bunch variety. It causes a wilting of the above-ground parts of the plant accompanied by rotting at ground level. The stalk and root tissues of affected plants, just below the ground, are dark and shrunken and have a somewhat shredded appearance. Frequently, black masses of fungus spores appear on the shredded tissues. Wilted plants subsequently succumb to the disease, and remain in a dry shrivelled condition.

The symptoms resemble those of another peanut disease, namely, wilt, but in this case the roots are intact. It is only on cutting the lower part of the stem that disease symptoms are seen in wilt, when it will be found that there is a brown discolouration of the tissues inside the stem.

White grub injury can also cause a wilting similar to that of crown rot, but this can be recognised by digging up affected plants, when the rather clean cut of the grub can be recognised, and as a general rule the grubs themselves can be found clustered around the roots or near the base of the plant.

Development.

Crown rot is the later stage of seedling blight, which is the more serious phase of the disease. Peanut seed, on germination, is liable to fungus infection. Minute cracks in the skin of the kernel, regarded as normal to shelling operations, form the point at which weakly parasitic fungi enter. Such fungi proceed to cause a rotting of the cotyledon in the presence of moisture.

If these fungi progress rapidly, then the kernel does not germinate or the sprout is killed before it appears above ground. Frequently, however, the infection develops slowly, and only destroys the cotyledon after it has performed its function of nourishing the seedling However, by gradual spead, it finally reaches the stem of the plant, and may cause its death at any stage up to full maturity. It is this latter collapse which is generally called crown rot. The loss of large plants may be more noticeable than that of seedlings but it is the depletion of stands at an early stage that is the more serious.

The disease is, to a certain extent, dependent on soil conditions. It is aggravated by any check in germination due to such things as unfavourable moisture conditions, poor preparation of the seed-bed, and planting in land which has been under cultivation for some time and which has deteriorated, particularly in physical condition. Peanuts following peanuts in the same soil for a number of years is, as would be expected, particularly liable to result in an increase in crown rot.

Occurrence.

Prior to the general adoption of seed treatment, stands of Virginia Bunch were very badly depleted by this disease. In recent years, as a result of routine application of fungicides to the seed, the incidence has been generally low except when planting has taken place on worn out soil or on non-typical peanut land on the outskirts of the main district. A further exception occurred one season when it was considered that harvesting conditions produced more than usual injury to the kernels.

Apart from these occurrences, in which plant losses have been sufficient to result in a serious reduction in yield, there is usually only a small loss of plants in most crops. The trouble is generally kept at a low level, but not eliminated.

Control.

In the control of the disease, it is essential to avoid any excess injury to the kernels. All machine-shelled kernels are liable to some injury and should be treated with an organic mercury preparation to protect them from fungous infection.

On the Virginia Bunch variety, Ceresan or Agrosan is used at the rate of 1 oz. to 20 lb. of seed. For Red Spanish, the same materials are used, but the rate is 1 oz. to 60 lb. of seed. In Queensland, these measures are in the hands of the Peanut Board, which carries out shelling and treatment and supplies treated kernels to the growers.

Very essential in disease control is the rotation of crops. Rotation with other farm crops, such as maize, grain sorghums, sudan grass, cowpeas, &c., is quite beneficial, but the best system includes a Rhodes grass sward. As a rule, three years of grass should be included in every ten-year period.

Discussion.

The foregoing indicates that the control of crown rot is bound up with general farm practices, most of which are beneficial quite apart from disease control. Such matters as seed selection and adequate cultivation help to maintain the high standard of crops which can be satisfactorily grown in spite of the disease under discussion. The complete elimination of crown rot would be very difficult. The fungi concerned are quite commonly found in the soil and on litter where it is not practicable to deal with them. Once they are inside the tissues of the plant, no external spray will check them, and internal plant treatment is not practicable. Hence, while seed treatment plus good farming will keep crown rot at a minimum, it would appear likely that complete eradication is, in the present state of our knowledge, an unattainable ideal. It is hoped that as increased information becomes available on the disease it may be possible to still further reduce its incidence.

TO SUBSCRIBERS.

Kindly renew your subscription without delay. Write your full name plainly, preferably in block letters.

Address your subscription to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Control of Nematodes in Tobacco Seed-beds.

R. C. CANNON, Assistant Entomologist.

THE root-knot nematode* thrives best in sandy soils under warm climatic conditions and thus has become a major pest in tobacco-growing areas, particularly those of tropical North Queensland. Plants may be attacked at any stage of growth, but the earlier the initial infestation the greater the likelihood of heavy crop losses. For this reason the aim should be to ensure, as far as possible, that seedlings are free of nematodes when planted out in the field, and this calls for particular attention to seed-bed preparation.

The earliest recommendations relating to seed-bed management stressed the need for effective sterilization of the soil with the object of destroying weed seeds, the spores of disease-producing organisms, and the various stages of insect and other pests. In view of the difficulties involved in steam sterilization, heat treatment by burning wood or organic matter from termite (white-ant) nests on the surface of the soil was the method adopted and it soon became standard practice. In the earlier years of tobacco-growing in North Queensland this method proved effective in controlling nematodes, but more recently nematode infestation has been found conspicuous in some seed-beds treated in this manner. Consequently, some farmers began to doubt its efficacy. However, there was also doubt as to the thoroughness with which the operation had been carried out in these cases.

In order to clarify the position and to investigate alternative methods of soil sterilization, a seed-bed experiment was carried out at Mareeba late in 1941. The burning method, using termite nest material, and steaming were compared with a number of chemical treatments and both proved distinctly superior to any of the chemicals tested.† There was little difference between the two methods of heat sterilization and, when the seedlings were examined in the early stages of growth, it was found that less than 4 per cent. of those grown in heat-treated soil had nematodes galls as against 23 per cent. in the untreated soil. In the course of the next few weeks infestation increased to 13 per cent. in the treated soil and 38 per cent. in the untreated. It was further noted that the heat treatments promoted vigorous growth and prevented the germination of weed seeds, whereas none of these results were obtained with any of the chemicals tested. Obviously, seedlings from the heat treated beds would have a better chance of normal development in the field.

Pending further investigation of the problem, growers are strongly recommended to disinfect seed-bed soils by the heat method. It has been the general experience that organic matter from termite nests, provided it is reasonably accessible, is preferable to brushwood in that it is more easily handled and burns steadily and uniformly. A day or two before burning the soil should be fairly well prepared and watered. Under these conditions nematodes are more easily killed as a better penetration of heat through the soil can be expected. The fuel should be spread evenly over the surface, including pathways and a margin of 2 or 3 feet around the area. Termite nest material should be applied as a layer at least 4 inches thick, whilst brushwood might be piled several feet high. The latter will burn rather fiercely and rapidly but the termite material will smoulder for hours, the length of time taken to complete the burn depending on the number of points at which it is ignited. When the ground has cooled the resultant ash should be raked in and the unburnt fragments removed, after which the fertilizer may be applied and the bed prepared for sowing. Since the effect of burning is not permanent there should be no unnecessary delay between the completion of the burn and the sowing of the seed.

---

* *Heterodera marioni* (Cornu) Goodey.

† Two very promising chemicals—chloropicrin and D-D—were not available for inclusion in the test.

It is not claimed that heat treatment by burning will give complete control of nematodes but it is considered that the degree of control to be expected is such as to warrant the time and effort involved. It is suggested that war-time conditions and labour difficulties during recent years may have operated against thoroughness with consequent poor results. It is important that the operation be carried out thoroughly and, in the event of serious failure, a grower would do well to examine his methods.

A POLICY FOR EVERY FARM.

Every farm, even the suburban farmlet, needs a policy. A policy of putting every surplus penny (when there is any surplus) into a sock may be better than no policy at all, but to be constructive, or progressive, we have to look and build ahead.

Take milk production, for example. The drive for more milk must go on, for there will be a world-shortage of food for many years to come and we shall be able to sell all the milk we can put into a vat and every pound of cream we can put into a churn.

There will come a day when milk will be paid for solely on its keeping quality and that will mean strict cleanliness every day in every way in every dairy operation. The sustained emphasis on clean milk has far-reaching implications and its importance can hardly be overstressed.

Full employment has been promised. In this imperfect world it is doubtful if we shall get it; but there will still be more jobs on dairy farms than good men to fill them. Unlimited farm labour is a vain hope, for certain modern trends are making the farm help position more difficult. Without a direct personal interest, there is a growing dislike for milking twice a day and seven days a week.

Mechanization is on the march, and with mechanization should be included electrification, as well as power machinery and other modern equipment. Ideas from industrial organisation are taking root, ideas which sound rather mystifying to the ordinary man when expressed in technical terms, but which are actually only technical words for common-sense saving of time, and avoidance of wasteful work. Anyone who works with cows knows that a lot of time and redundant toil can be wasted in ways which could be avoided by better planning of farm layout and equipment. Only the diehard is content to work harder for less reward than, perhaps, his neighbour who is not afraid or suspicious of a new idea—say, of improved breeding and feeding practice, bacteriological control of milk quality (otherwise keeping dirt out of the dairy), maintenance of animal health and so on.

Long-term loans at reasonable interest and a more complete application of the co-operative principle would go a long way towards solving some of our rural problems. A system of interest-light loans is, however, merely a suggestion and not a prophecy.

Anyhow, it is believed that any impending change in milk production methods will not affect to any great extent the survival of the small dairy farm of the "farm family" type, provided, of course, that such a farm will continue to be progressive, for there seems to be no reason why modern dairy methods cannot be applied, generally, whether a farm be small or large.

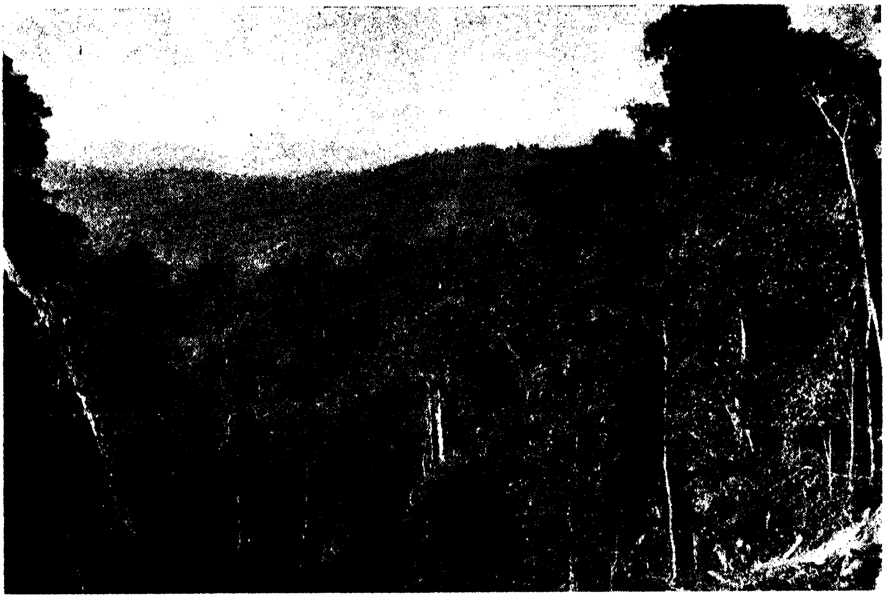
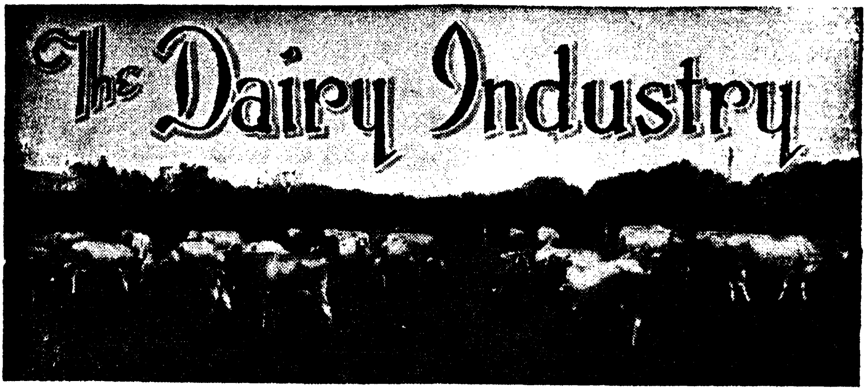


Plate 14.

NORTH QUEENSLAND JUNGLE LANDS, WEST PALMERSTON.

Plate 15.

CLEARING JUNGLE LAND FOR FARMING—A NEW SCRUB "BURN."



Observations on Dairy Manufactures in New Zealand.

E. B. RICE, Director of Dairying.*

As in Australia, the manufacture of butter is the main use to which the milk produced in New Zealand is put, approximately 75 per cent. being utilised for this purpose. The New Zealand factory butter output is somewhat less than that of Australia, the average yearly production for the five-year period 1939/40-1943/44 being:—New Zealand 150,000 tons, Australia 173,000 tons.

Cheese, of which cheddar is practically the only variety made, ranks second in order of importance of the dairy products manufactured, the comparative average annual productions for New Zealand and Australia for the five-year period mentioned being:—New Zealand 114,000 tons, Australia 32,000 tons.

Other manufactured products are powdered wholemilk, evaporated milk, condensed milk, casein. The needs of the liquid milk market are considerably less than in Australia, as the population of New Zealand is no more than 1,500,000.

The New Zealand Co-operative Dairy Co. is the largest co-operative dairy company in the world. It operates butter, cheese, evaporated milk, condensed milk, powdered milk and milk pasteurising factories. Its production for 1944/45 was 52,000 tons of butter, 18,000 tons of cheese, 11,000 tons of milk powders and 6,000 tons of condensed milk.

In the Dominion the general practice is to fix the rate of payout per lb. butterfat in the dairying season on a conservative basis, with a view to making a substantial deferred payment in July when most suppliers' cream cheques are very low because of the herds being dry at that time.

Shareholding in Co-operative Dairy Associations.

The factories are almost entirely co-operatively owned by the producer-suppliers. The method of financing the establishment of a co-operative dairy company and the allocation of shares to suppliers differs fundamentally from the system in vogue in Queensland. In Queensland, a supplier is required to accept shares in the factory, but it is usually only necessary to apply for a prescribed minimum number of shares, say, ten, irrespective of the quantity of milk or cream supplied. In New Zealand, the supplier in almost all co-operative dairy associations is obliged to take out shares in proportion to the amount of produce supplied. For example, the basis of shareholding capital may be one share for every 100 lb. butterfat supplied in the course of the year. If in subsequent years the production of the farm increases above that of the base year, additional shares have to be taken up. The supplier is given a period of years in which to subscribe his share capital; the amount deducted from his monthly pay cheque towards defraying the cost of the shares is usually ¼d. per lb. butterfat supplied.

---

* In an address to Aust. Inst. Dairy Factory Managers, 19th June, 1946.

Voting power for election of co-operative dairy company directorates also is based on the number of shares held by a supplier. No dividends are paid on co-operative dairy associations' shares. Co-operative association legislation also makes provision for associations to take over the shares of any supplier who ceases dairying. Usually the associations pay 75 per cent. of the value of fully-paid up shares so surrendered. In actual practice, the shares are usually taken over by the incoming supplier.

Milk and Cream Transport.

Milk and cream supplies are zoned to factories. Conveyance of milk and cream from the dairy farms to factories is operated either by the co-operative dairy associations with their own trucks, or by contractors. The trucks do not enter the farms to pick up the produce, which is taken by the supplier to the roadside, or, especially in the case of milk, to a dump. These dumps—large wooden platforms—are so situated that no farm is more than one mile away.

In the intensive dairying districts of the North Island, farms are generally in relatively close proximity to factories and are well served by good roads. Despite the moderate climate, cream is delivered daily (including Sunday) to factories in the summer months, and, in fact, most of the year. In the South Island, cream deliveries are usually thrice weekly. The farmers there are usually engaged in other farming activities besides dairying. In specialized dairy districts, cheese production is dominant. For example, in the province of Southland there are 60 cheese factories and only three butter factories.

The average cost of getting cream to the factories is estimated to be about one-third of a penny per lb. butterfat.

Butter and Cheese Quality.

For the year ended 30th June, 1944, the average grade of export butter was 93·359 points. The percentages in the various grades were:—Finest (corresponding with Australian choice) 82·97, first 16·77 and under first 0·25 per cent. The average grade of cheese was 92·076 points. The grading percentages in different grades were:—Finest 22·84, first 72·63 and below first 4·52 per cent.

These creditable results clearly emphasise the necessity for a policy of improvement to be vigorously pursued in Queensland, if our output of dairy produce is to compete on the basis of equality and uniformity on the British market.

Butter Manufacture.

Butter manufacture does not differ markedly from the methods employed in Queensland. It is therefore unnecessary to give details of processing, and reference will be made only to any departure from Queensland practice or equipment.

1. The large output of factories was noticeable. The largest factory in New Zealand, at Rangitaiki Plains, annually produces 5,000 tons of butter. There are 730 suppliers whose farms are mostly within 12 miles of the factory.

2. The basis of payment for cream received differs from that in Queensland. Cream is purchased on its butterfat content in contrast with the Queensland system of payment on estimated commercial butter content.

3. Whereas each delivery of cream to Queensland factories has its fat content determined, the New Zealand factories take a composite sample over a ten-day period for the determination of the fat content.

4. Butterfat contents of cream are determined by the more accurate weighing method, and not volumetrically as in Queensland. A tester can handle about 225 samples a day by the weighing method.

5. The New Zealand regulations prescribe that any cream of sub-standard test (less than 35 per cent. butterfat) shall be subject to a deduction of ½d. per lb. butterfat.

6. Booking-up of cream supplies on the factory platform is efficiently performed. Most factories have installed a type of calculating machine specially designed for use in butter factories. This has facilitated the work of sending out dockets to suppliers.

7. Because of daily delivery, cream supplies to North Island factories arrive at the factory with low acidity (·12 to ·16 per cent.). In processing, the range to which the acidity was reduced was ·06 to ·08.

8. "Straight-through" can washers are chiefly used, in contrast with the Australian rotary washer.

9. Cream holding vats are usually of greater capacity than those favoured in Australia and combined with the larger churns these vats economise in factory space.

10. About 80 per cent. of the butter is produced from cream treated by vacreation. Most factories in the Auckland province, in which feedy cream flavours are pronounced, double vacreate the cream.

11. Churns are usually larger than in Australia. The 100-box churn finds favour in large factories, but factory operatives expressed preference for 65-box churns.

12. A salt crusher to grind the salt used for buttermaking to a fine state is used in most factories. This equipment would be a desirable introduction to Queensland factories. It eliminates hand sieving, reduces labour and makes the salt more suitable for incorporation in the butter.

13. Moisture and salt contents of butter are well controlled. The objective is to churn butter of 15·8 per cent. moisture content and about 1·4 per cent. salt content.

The New Zealand regulations prescribe a minimum and maximum salt percentage. The maximum permissible is 2·0 per cent. with a minimum of 1 per cent. from July to November, and 1·25 from December to June.

The general average composition of butter would be water 15·7 per cent., salt 1·4 per cent., curd 0·9 per cent., fat 82·0 per cent. This reflects well controlled temperatures and efficient workmanship.

14. The New Zealand butter box, or fibre container, differs in shape from the standard Australian butterbox. It contains 56 lb. butter, as in Australia, but is of oblong sides with square ends in comparison with the Australian cube-shaped box.

15. Coal is used in all factories for fuel. Automatic mechanical stokers are commonly used in factory boiler houses.

16. Factory buildings are of variable structural standards. Taken as a whole, Queensland factories lose nothing by comparison.

Cheese Manufacture.

The production figures already quoted show that cheese production in New Zealand is more than three times that of Australia.

The cheesemaking procedure is similar to that in Queensland, with only slight modifications influenced by soil and climatic factors. Cheese factory suppliers mostly deliver the milk themselves to the factory—contract cartage by milk carriers is not done to any extent. The whey is taken back by farmers for feeding pigs, though in the South Island many factories do not return whey. It is usually collected from a number of factories and conveyed to a central plant for conversion into lactose, or a stock food called milky whey paste, and factories for manufacturing penicillin from whey are under construction.

Other observations include:—

1. Cream separators are not permitted in cheese factories and even the starter milk is not separated.

2. The whey is usually separated to recover its fat content. The recovered fat is manufactured into whey butter. The yield of whey butter is approximately one box (56 lb.) to each ton of cheese made. The return from whey butter approximately pays the whole cost of employees' wages. For example, one association operating a number of cheese factories had a wages account for the year of £20,000 and the return from whey cream was £19,000.

3. The grading of milk and payment of differential prices for bacteriological quality is compulsory. The differential is ½d. per lb. butterfat less for milk below first grade. The methylene blue, New Zealand curd and "senses" tests are used for this grading. Milk which is decolourised in the methylene blue test in less than two hours is classified below first grade. The methylene blue and curd tests are usually combined, giving what is known as the New Zealand curd test. A special machine made by a New Zealand firm is used for carrying out the test. Apart from the methylene blue test, the curd is examined after six hours by a "senses" test—smell, taste and appearance—and if considered below first grade, the milk is degraded, even if the methylene blue test exceeds two hours.

4. Milk is supplied in 20- or 25-gallons straight-sided cylindrical cans.

5. Labour in factories is usually one man per vat, plus the manager. In large factories a fireman is employed to care for the boiler and accessories, and if whey butter is made at a large cheese factory a buttermaker also is employed.

6. Pasteurization is practised in almost every factory. The plate heat exchanger type of pasteurizer is displacing the regenerative dome-

type pasteurizer. Pasteurization temperatures for cheese milk are usually about 150-155 degrees Fahr. Higher temperatures favour open-bodied cheese.

7. Single strain "starters" of lactic acid streptococci, prepared and distributed by the Dairy Research Institute, are used throughout the cheese factories. They aid in standardizing manufacture more than a mixed culture. A problem associated with single strain starters is the retention of their active acid production during the manufacturing process, as they are subject to infection with bacteriophage. Phage-infected starters become "slow" in acid development and, in extreme cases, fail completely.

The Dairy Research Institute has studied this problem over many years and has shown that bacteriophage is spread by the "mist" which is always present in a factory during the separation of whey. It may become established in the cheesemaking vats and other equipment and may be in the farmers' cans for taking whey from the factory to the farm.

Recommendations now made for the control of the incidence of bacteriophage involve:—

(*a*) The propagation of starter in an isolated starter room. If this is not provided, it is advised to keep the starter in a room which does not allow of direct access from the cheese-making room.

(*b*) The provision of "water-sealed" lids for the bulk starter cans. The bulk starter heating compartment is fitted with a close-fitting hood.

(*c*) The provision of a pipe let through the factory roof and ceiling into the cover of the bulk starter cabinet. Cotton wool is packed in a container fitted to the end of this pipe outside the factory to filter air drawn through the pipe during the cooling of the bulk starter milk. The outside air thus drawn into the starter cabinet is less likely to be infected with phage than air from inside the factory and the filtration is a further precaution.

(*d*) Daily rotation of starters, using at least four separate strains, for each of which there is a specific bacteriophage which attacks it only and not the other starters propagated. By using each day a different starter strain, the phage for which does not attack the other strains, building up of bacteriophage from day to day, as would occur if only one single strain starter were used, is minimised.

8. Mechanical curd agitators, of the fixed overhead type used in many Queensland cheese factories, also are used in New Zealand, but other types also are used. In one type the agitators travel up and down the vat lengthwise, the agitator itself being of spade-like construction. It was claimed by the cheesemakers to give better "cooking" of the curd and minimises the aggregation of the curd pieces in the corners of the vat. Another kind of agitator of New Zealand manufacture travels round the vat.

9. When running off the whey, many factories insert in the vat a V-shaped "gate" to facilitate rapid removal of the whey. This device consists of two pieces of hinged stainless steel each 4 ft. 6 in. long, 10 in. deep, with 10 rows of holes.

10. The McEwan electric curd mill, made in New Zealand, is used for milling the curd. Similar mills are used in some Queensland factories.

11. Another aid to mechanization of cheesemaking observed was a curd fork. This is operated from the overhead mechanism installed for the ordinary curd agitators used in "cooking." This curd fork is used for stirring the curd after milling. The forks, which travel up and down the vat lengthwise, eliminate manual stirring. It is, however, still necessary, from time to time, to throw the curd which collects along the sides of the vat into the centre in order to ensure even stirring of all curd.

12. The rimless cheese moulds used in Australia are not used in New Zealand. The moulds used give a small crown, but the *Dairy Act* prescribes this shall not exceed ⅜ inch. A better finished cheese results from the Australian rimless mould. Curd is not weighed before being filled into the hoops.

13. Hydraulic cheese presses are used in many factories. The pressure applied is 200 lb. per square inch, but as friction between the sections of the cheese moulds results in a loss of 40 per cent. of efficiency, the actual pressure exerted on the cheese is 120 lb. per square inch. Pressure in the ordinary horizontal screw cheese press is about 80 lb. at the start, but this decreases as the whey exudes. The higher pressure attainable, with a hydraulic press, is considered to give a closer bodied cheese, with less possibility of mechanical openness.

14. Although atmospheric temperatures are much lower than in Queensland, many factories are equipped with air conditioning plants for the control of temperature and humidity of cheese-holding rooms. The regulations require cheese to be held at the factory for 14 days before despatch to cold stores.

15. Cheese held in cold stores at ports awaiting shipment is stored within the temperature range of 42-45 degrees Fahr. from August to December and 47-49 degrees Fahr. between January and July. The relative humidity of the cold store is maintained at 84 per cent.

16. Typical yields of cheese were:—

	Lb. milk to lb. cheese.	Lb. Cheese to lb. fat.	Av. Test.	Whey Recovery.
New Zealand ..	8·64	2·50	4·62	6·07
Queensland ..	9·72	2·75	3·72	—

17. The average analysis of New Zealand cheese (14 days old) is:—moisture 33·5 per cent., fat 37·0 per cent., solids not fat, 29·5 per cent.

Butter and Cheese Grading.

All dairy produce is subject to grading by officers of the Department of Agriculture and, in the case of export produce, every churning of butter and vat of cheese is graded. Laboratories for the systematic examination of dairy produce are established at Wellington and Auckland.

The official grading systems in operation in New Zealand and Australia differ somewhat in the characteristics of butter and cheese assessed, the points allotted for specific purposes, and the range of points awarded for the various grades. For instance, the highest quality butter grade is known as finest, in contrast with the term choicest used in the Australian system. Possibly the most pronounced difference is the stress placed on closeness in the grading of cheese in New Zealand, 20 points being allotted for this purpose, as well as 20 points for body.

In actual grading practice in New Zealand, full points are never allotted for body and texture of butter and cheese or closeness of cheese. Half points are also scored as final points in contrast with the Australian system of never giving half points in the total score.

Laboratory Examinations at Grading Ports.

Every churning of butter is examined for its moisture and salt content. These are entered on the grading advice note returned to the factory.

A composite sample of all butter packed in each brand is taken three times monthly and the curd content estimated.

A composite sample consisting of a portion of a plug from each vat of cheese in every consignment from a cheese factory is taken for the estimation of fat content.

One composite sample of cheese is examined monthly for moisture content.

The iron and copper content and pH of samples of butter are also determined regularly with a view to minimising metallic contamination, a cause of deterioration of cold stored butter.

In addition to the chemical analyses, all butters are examined at frequent intervals for bacteriological quality. The factories and the field instructional staff receive copies of all these reports, which are of much assistance in locating any foci of contamination in factories, and in control of composition.

The analytical and bacteriological methods used, and standards applied, were obtained from Dr. Moir, who is in charge of the Dairy Division's laboratories.

School Milk.

A Milk-in-Schools Scheme has been in operation in New Zealand for some years. This provides for every school child receiving free of cost a half-pint bottle of pasteurized milk every school day. Strict control (including laboratory tests) is exercised over the quality of this milk.

Milk in Bread.

It is the customary practice amongst New Zealand bakers to incorporate a proportion of a specially prepared milk powder in bread. There are, however, wide differences in the quantities of milk used by individual bakers, some using up to 6 per cent. Apart from the nutritional value, milk improves other qualities of bread. This potential market would appear to warrant the serious consideration of the Australian dairy industry.

Other Manufactured Products.

Factories engaged in the manufacture of unsweetened evaporated milk, dry milk powders, rennet, casein and processed cheese were visited in the course of the itinerary. Every facility to observe the various processes was freely given in every instance and much valuable technical information was obtained.

Research Applied to Dairy Manufacture.

The Dairy Research Institute carries out research on the manufacturing and related aspects of the dairy industry. The industry, through the Dairy Board, makes an annual contribution towards the cost of maintaining the Institute. In 1943-44 the grant was approximately £7,500. An advisory committee, called the Dairy Research Management Committee, guides the research activities. It comprises:

Three members appointed by the Dairy Board;
One member appointed by the Research Council;
The chairman of the Research Council;
Director of Dairy Division, Department of Agriculture;
Director of the Export Division, Marketing Department;
One member appointed by the Board of Governors of Massey Agricultural College;
One member appointed by the Factory Managers' Association.

A two-day meeting is held at the Institute every year in May, at which factory managers and first assistants discuss with the Institute staff research work in progress. This is an excellent means of bringing research workers and factory personnel together for discussion of mutual benefit, and of expediting the practical application of research results.

Determination of Salt in Butter.

L. A. BURGESS, A.A.C.I., Dairy Technologist.

IN the buttermaking process it is necessary for the buttermaker to know the salt content of the finished butter as different markets require different salt percentages; there also is a legal maximum percentage which should not be exceeded. Methods which incorporate all the salt which is added to a churn of butter make salt control easy and in such cases there is no real necessity for factory salt tests to be performed, unless the objective is close to the legal maximum.

One such method of buttermaking was given in a previous article*, but such methods are not acceptable to all buttermakers. Some methods used result in an unnecessary waste of salt and are not conducive to accurate salt control; it is necessary for salt tests to be frequently made at the factory if even a reasonable degree of control is desired by these methods.

One method only, of the many available, has been selected for description. It has been chosen because of the similarity in calculation to the acidity test, its simplicity, cheapness, and rapidity, ten minutes being ample time for its performance. It is really an extension of the

---

* Q.A.J. 1946. Vol. 62. Part 3 (March) pp. 151-156.

moisture test, the residue of the 10 grams of butter being used for the determination of salt. If performed as directed the test will give results sufficiently reliable for all factory purposes.

Material Required.

A balance on which exactly 10 grams of butter are weighed for the moisture test is essential. The additional materials required are:—

(1) *Glass Stirring Rods.*—These should be 4 to 5 inches long and three-sixteenths of an inch in diameter. The ends should be smoothed and rounded in a flame.

(2) *Measuring Cylinder.*—100 ml. graduated in 1 ml. divisions.

(3) *Pipette.*—Either a 25 ml., 20 ml., or 17·6 ml. pipette may be used.

(4) *Burette.*—This may be either of 25 ml. or 50 ml. capacity graduated in 0·1 ml. divisions. It must have a glass stopcock.

(5) *White Titration Vessel.*—A shallow porcelain dish holding about 100 ml., or a shallow white china cup may be used.

(6) *Mixing Vessel.*—This is used to mix the residue from the moisture test and a measured volume of distilled or rain water. A malted milk shaker is quite suitable, but a wide-mouthed bottle with a cork, rubber or glass stopper will also serve. A round rubber heel makes a suitable lid for the moisture test cup, in which case the mixing may be performed therein, and a separate mixing vessel and the glass rods will not be required.

(7) $\frac{N}{23{\cdot}4}$ *Silver Nitrate Solution.*—1 ml. of this solution is equivalent to 0·0025 gram of sodium chloride (salt) and it should therefore be obtained from a reliable chemical supply house or prepared by an experienced analyst. It should be supplied in a brown glass-stoppered bottle and should be kept away from light. The solution should not be allowed to remain in the burette after use, as light causes silver to be precipitated and weakens the solution.

(8) *Potassium Chromate—Solution* (10 per cent.).—This is the indicator solution. Its strength is not very important but it must be prepared with distilled or rain water.

(9) *Distilled* (*or Rain*) *Water.*—Natural waters contain salt in varying amounts and should not be used.

Procedure.

Weigh out 10 grams of butter and perform the moisture test. Warm a quantity of the distilled or rain water to a temperature of about 120 deg. Fahr.

In the measuring cylinder, measure out the quantity of warm water shown below.

If a 17·6 ml. pipette is to be used— 70 ml. of water.
If a 20 ml. pipette is to be used— 80 ml. of water.
If a 25 ml. pipette is to be used—100 ml. of water.

(It should be noted that the volume of water required is four times the capacity of the pipette.)

If a close-fitting lid for the moisture test cup is available, the whole of the measured volume of water may be added direct to the butter residue and the mixing performed at once in the cup.

If such a lid is not available proceed as follows: —

Add about a quarter of the measured volume of water to the residue of the 10 grams of butter in the moisture test cup and stir thoroughly with a glass rod.

Pour the liquid into the mixing vessel.

Add a further 20 to 25 ml. of the water to the cup and stir again.

Pour this liquid also into the mixing vessel.

Repeat the addition of water to the moisture test cup, stirring and pouring into the mixing vessel until all the water has been used and all the remains of the butter have been transferred, but in no case use more than the quantity of water originally measured out. The water must be warm enough to keep the fat in a melted condition.

Mix the liquid in the mixing vessel by very vigorous shaking. It is essential that the mixing be vigorous as the fatty coating on the solid material must be destroyed in order that the water may dissolve the salt.

Allow to stand undisturbed for 2 to 5 minutes so that the fat may rise to the surface.

Insert the tip of the pipette below the fat layer and fill from the lower water layer by suction. Adjust the bottom of the meniscus to the graduation mark on the pipette and allow the contents of the pipette to run into the titration vessel.

Add four to six drops of potassium chromate solution to the liquid in the titration vessel.

From the burette allow the silver nitrate solution to run into the titration vessel and stir with a glass rod. The formation of a reddish colour marks the end of the titration.

To obtain the percentage, read off the number of millilitres of the silver nitrate solution used and divide by ten.

Example.—A titration of 14·2 ml. shows the salt to be 1·42 per cent.

Theory of the Test.

During the titration a white precipitate of silver chloride is first formed by interaction of the salt and silver nitrate.

$$\mathrm{NaCl} + \mathrm{AgNO_3} \longrightarrow \mathrm{AgCl} + \mathrm{NaNO_3}$$

$$\begin{array}{ccccccc} \text{Sodium} & & \text{Silver} & & \text{Silver} & & \text{Sodium} \\ \text{Chloride} & + & \text{Nitrate} & \text{forms} & \text{Chloride} & + & \text{Nitrate} \end{array}$$

As soon as all the sodium chloride has reacted in this way, the excess silver nitrate reacts with the potassium chromate forming silver chromate (which is an intense red colour), and potassium nitrate. The formation of red silver chromate thus serves to mark the end of the titration.

Water on the Dairy Farm.

D. S. ROBERTSON, Dairy Officer.

AN adequate supply of clean, fresh water to keep animals supplied with all the water they can drink and for cleansing operations in the dairy is essential on every dairy farm.

Generally, Queensland subterranean waters are highly mineralized and need treatment before they are suitable for washing milking machines and dairy utensils. Hence it is the practice, on most dairy farms, to have one water supply for the stock and another for use at the dairy.

Water for Stock.

The necessity for an adequate supply of water for the dairy herd is apparent when it is realised that milk contains approximately 87 per cent. water. The daily intake of water by a dairy cow is governed mainly by temperature, milk yield, and the nature of available food. It is estimated 3 to 4 gallons are needed for each gallon of milk produced. Cows in milk will thus require 12 to 15 gallons daily and even more in the case of heavy milkers. Green pasture consists of up to 80 per cent. water, but the cow must receive additional amounts of water beyond that obtainable from the pastures, especially when the pastures are drying off. Milk production is often limited simply because the cows cannot conveniently get enough good water. Therefore, at all times, water should be freely available to the animals. This water supply may be one of three kinds, viz.:—(*a*) wells or bores; (*b*) creeks or rivers; (*c*) dams.

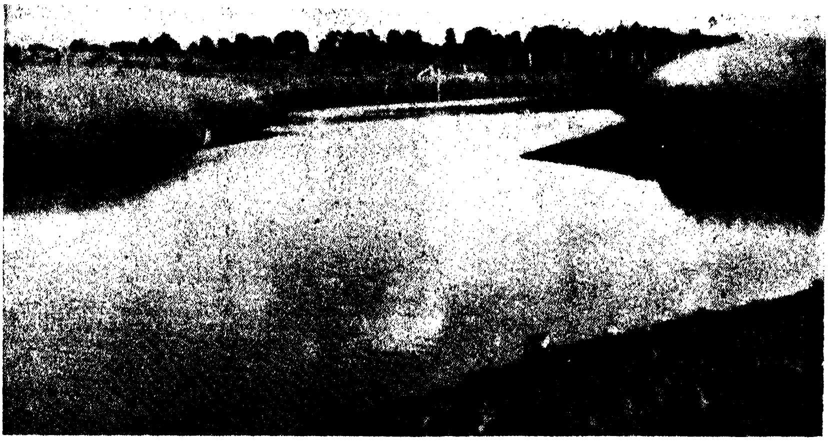


Plate 16.

DAM ON MONTO DAIRY FARM.—On the property of Mr. C. Luthje, a four-wire fence prevents stock from gaining direct access to water.

Water from Wells or Bores.

The water from wells and bores, being usually clean and fresh, needs only to be pumped into a storage tank, from which it can be supplied to a drinking trough. Ground waters, however, often contain an excess of salts which are injurious to the health of stock, so that a sample of at least one pint in volume (an ordinary beer bottle) should be sent to the Agricultural Chemist of the Department for analysis and advice. The bottle should be labelled, giving full particulars of source of supply and other circumstances, also the name and address of the sender.

The water trough should be cleaned out regularly, in order that no heavy deposit of green slime accumulates on the water and the sides of the trough. The site of the trough should be carefully selected, an adequate slope in all directions away from the trough being necessary, so that water does not accumulate around the drinking site and form a bog. During dry weather a green slime may form on the surface of well water, in which case it is necessary to immerse the pump in the water to a depth sufficient to avoid pumping up particles of this slime.

Plate 17.

CONCRETE WATER TROUGHS ON MR. C. LUTHJE'S FARM NEAR MONTO.—Water supply for these troughs is siphoned from the dam shown in Plate 16.

Water from Creeks and Rivers.

Water from creeks and rivers may be either running or still.

Running water is generally preferable to still water as the latter may become stagnant. In either case, it is unwise to allow the cattle to wade into the water to drink. The best method of using such a water supply is to pump the water from the creek or river to a storage tank on the bank and then run the water into a trough. In some cases, where a stream is running constantly and the approaches to the water's edge are gravelly or sandy, cattle may be allowed to drink directly from the stream, but in some districts such a water course is the exception rather than the rule, and if its banks are composed of friable soil the cattle will erode the banks and cause the approach to the water's edge to become boggy. Moreover, as the ropy bacteria of milk and cream are found in stagnant water, cattle should be excluded from such pools. When the cows wade into the water these particular bacteria become attached to the udder and flanks and may fall into the milk bucket during milking. To avoid this risk, cattle should be watered from a trough rather than from the stream.

Water from Dams.

There are dams in many districts, but more could be fitted with an adequate silt trap, fenced off, and the water pumped into a tank and run into a trough. Where it is possible to syphon the water from the dam to the trough, it is not necessary to provide a storage tank if the trough is fitted with a self-regulating float (see Plates 16 and 17). Again, as with creeks, the dam should be fenced off and the water pumped or syphoned to a site remote from the main supply.

Water for stock can be kept clean and cool if the troughs are regularly cleaned out and shaded from the direct rays of the sun, especially during hot weather.

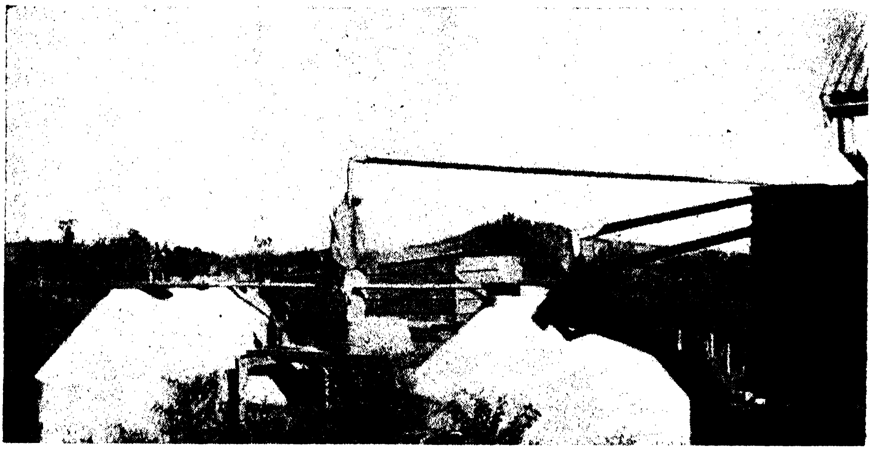


Plate 18.

WELL CONSTRUCTED, REINFORCED CONCRETE, PARTLY UNDERGROUND TANKS ON FARM NEAR MONTO.—Each of these tanks on Mr. C. Luthje's holding has a capacity of approximately 3,500 gallons.

Water for Cleansing in the Dairy.

Clean, soft water is necessary for washing milking machines and dairy utensils, and this is nearly always supplied in the form of rain water, the storage tanks being situated at the milking shed. To be successful, such a water supply should be protected from contamination by dust, manure particles, and bird droppings which float in the air or lodge on the roof of the milking shed. Dust-proof covers and filters fitted to the inlets of the tanks will keep out dust and foreign matter. While rain water is usually stored in galvanised iron tanks, concrete underground tanks are very satisfactory, if correctly constructed and reinforced (see Plate 18). Such tanks should be fitted with a pump to draw the water to the surface. Concrete underground tanks, if properly enclosed and protected, will keep water clean and cool. They are economical to build and, unlike iron tanks, will not rust.

The one constant defect with a rain water supply at the milking shed is inadequate storage capacity. Most milking sheds are provided with either a 1,000- or a 2,000-gallon tank, a capacity insufficient to tide over the long dry spells experienced often in dairying districts. Four thousand gallons of rain water should be considered the absolute minimum on any dairy farm, and if this supply is drawn on for washing out the bails and separator room, 6,000 gallons would not be too much to store. Such an amount could be conveniently collected in one 2,000-gallon galvanised iron tank, and one 4,000-gallon underground concrete tank, the latter being provided to catch the overflow of the first storage tank.

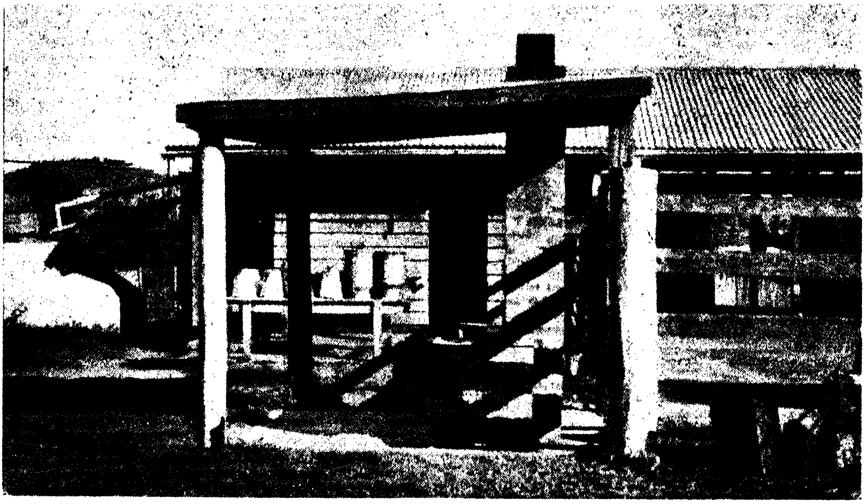


Plate 19.

A 12-gallon Copper, Bricked in and Sheltered from the Weather.—Note the lid on the copper. Photo. taken at C. Luthje's farm, Monto.

The Dairy Hot-Water System.

The usual hot water system on a dairy farm may be one or other of the following:—

(*a*) A bucket of water heated on the kitchen stove and carried to the bails;

(*b*) A kerosene tin of water heated on an open fire at the dairy ;

(*c*) A 12-gallon boiler situated at a convenient distance from the wash-up trough;

(*d*) A steam sterilizer; or

(*e*) An electric water heater.

Methods (*a*) and (*b*) are strongly condemned as the volume of water is insufficient for the work and the water is never boiling when it is used at the bails. Of the remaining alternatives (*d*) and (*e*) are the most efficient. The former not only provides a sufficiency of boiling water, but it also enables the dairy farmer to steam out his plant and so kill all harmful bacteria which may be present. It should be clearly understood, however, that sterilization does not allow one to neglect any part of the preliminary cleansing, for should live steam be applied to pipes or utensils from which all traces of milk have not been completely removed, the steam will only bake the milk casein on to the metal and this casein, besides being very difficult to remove, also acts as an ideal breeding-ground for bacteria.

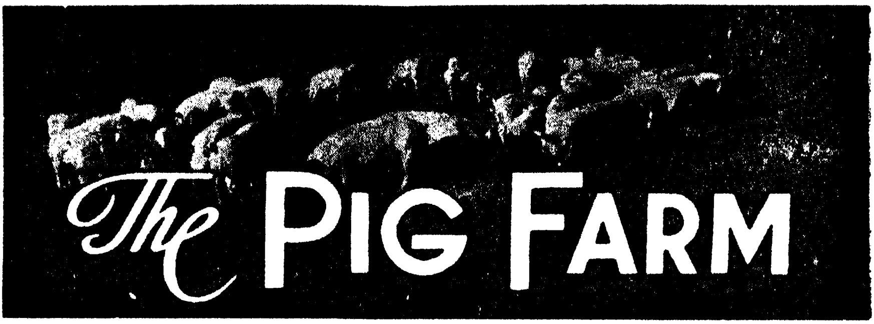
If the farmer is using a 12-gallon copper for boiling his washing water, he would be well advised to build a brick or cement stand for the container, and, for the comfort of the dairy hands in wet weather, to house it in a galley adjacent to the milking shed (see Plate 19). If he does this he will find that such a stand will outlast a cast-iron stand, and that the water will boil with less fuel than would otherwise be used. However, the farmer should always remember that no matter how elaborate or expensive his hot water unit may be, it will fail in its purpose if the unit does not provide sufficient water at a temperature of 212 degrees F.

WATER CONSERVATION.

In the last annual report of the Irrigation and Water Conservation Branch of the Department of Public Lands details were given of completed water storage projects along the Lockyer and of other similar works in progress, in prospect, or under consideration in various parts of the State. These include studies of the water storage possibilities in the Albert, Burdekin, Bremer, Condamine, Dumaresq, Mary, McIntyre, Nogoa, Pioneer and Walsh Rivers; Canungra, Granite, Molongle, Reynolds, Sandy (near Warwick), Waterfall and Waterview Creeks. Additional surveys and investigations in relation to the development and use of underground water supplies in the Lockyer and Bremer Valleys have been carried out. Similar work is proceeding in the valleys of the Don and Dee, south of Rockhampton; and a commission of inquiry is now engaged on the investigation of possible weir sites on the upper and lower reaches of the Boyne River in the Gladstone district.

Plate 20.

BUNGIL BAY, NORTH QUEENSLAND.



Mortality in Pigs.

F. BOSTOCK, Officer in Charge, Pig Branch.

PIG litter losses may occur from one or more of the following causes:— Stillborn, overlying, scours, runts, insufficient milk production of sows, pneumonia and colds, parasites, savage sows and accidents. A very large proportion of deaths from these causes can be attributed primarily to faulty feeding, bad management, poor housing and living conditions. All are within the power of the farmer to rectify, and were these matters given more consideration and thought, the lowering of production costs and more economical operation of the piggery would result.

The average sow is prolific enough, and while the use of prolific sows is essential to profitable pig production, it is considered that better methods of management, feeding and housing are more important than merely increasing litter numbers. From figures made available recently, it has been shown that only 5.27 pigs from every litter born survive and are sent to market. This figure is low and represents a large percentage of mortality in pigs, which could be greatly reduced were more attention given to housing, grazing range, better rations and feeding methods. Therefore farmers are urged to make a thorough overhaul of their pig section, together with the introduction of better feeding methods.

The pig, at one time, in its natural surroundings, lived on foods such as roots, grass, nuts, fallen fruit, and earthy substances, but took a considerable time to reach maturity. It is not so very long ago that a pig required 10 to 12 months to reach bacon weight, but under improved breeding and feeding this time has been reduced to six or seven months. Such rate of growth is remarkable and is found in no other farm animal, yet there are farmers who expect to obtain this rapid growth without giving the necessary attention to feeding and other essentials in successful piggery management.

The pig, it would seem, is regarded as a machine by which so many pounds of food may be economically converted into so many pounds of meat suitable for human consumption. The necessity for careful management, feeding and an understanding of the pig's requirements, is, therefore, obvious.

Cleanliness is one of the first principles in profitable pig raising. A clean pig in a clean sty will respond more rapidly to good feeding than a dirty pig in a dirty sty; also dirty sties and yards harbour disease. Land on which pigs have been allowed to run continuously becomes pig sick after a time and pigs will not thrive on it, and may become infested with parasites which cause unthriftiness, in some cases even death.

Therefore, it is advisable to see not only that the pens are kept clean, but that yards and paddocks in which a number of pigs have been running for some time are ploughed and limed at least every three or four years.

Some of the advantages of the outdoor or grazing system of pig raising are:—

1. Pigs live under more or less natural conditions.
2. From the soil and grass, pigs are able to obtain substances which are essential for their health and proper development.
3. Exercise helps to build up healthy constitutions.
4. Pigs benefit from the health giving rays of the sun, which besides ensuring the full use of minerals obtained from the soil, also enable pigs to store up vitality.

POINTS IN PIGGERY MANAGEMENT.

The feeding of pigs in mud holes is unpleasant, unhealthy, and a wasteful practice. Much of the food is trampled in the mud, instead of going into the growth and development of the pigs. The cost of providing feeding floors would be easily compensated for by the amount of feed saved, and in the improved health of the pigs. These floors should be so constructed as to be easily kept clean and sanitary, thus reducing the incidence of disease or worm infestation, and making the job of feeding in wet weather much more pleasant. It is advisable also to see to the drainage from the piggery and have all mud holes and wallows filled in. wet, sloppy yards make pigs uncomfortable, especially in wintry weather, and consequently more or less unthrifty. Sheds should be inspected, and any cracks in the lower walls or floors covered, while attention should be given to loose wires, posts and holes in the fences.

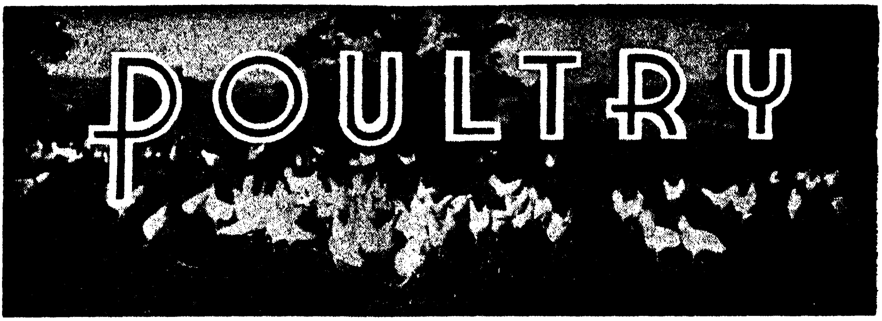
Although much of this labour may appear, on the surface, unnecessary, it should be realized that the object in view is to ensure comfort and warmth, conditions necessary if pigs are to maintain growth, and remain healthy.

A common fault in piggery management is to permit small and large pigs to feed together. A careful grading of the pigs at feeding time and more especially during winter is of great importance, as it gives every pig an opportunity of getting its proper share of food.

A cold, uncomfortable pig never utilizes its food to the best advantage. Therefore consideration should be given to the provision of sufficient shelter and room to prevent overcrowding. Good housing gives protection against draughts, and ensures dry and warm sleeping quarters. Usually, pigs fed suitable rations generate enough body heat to keep them comfortable, provided the houses are free from draughts and properly ventilated. Clean dry bedding, frequently renewed, adds greatly to the comfort of the animals.

In winter time particularly, pigs should be given plenty to eat. The quality of the ration is also an important consideratoin, but it is a great mistake to limit the amount of the ration below that necessary to ensure normal growth and contentment.

—F.B.



Sex Determination of Day-old Chickens.

C. MANNING, Poultry Inspector.

IN all branches of poultry raising, economy in production is of utmost importance. The raising of hens for egg production may be done without the presence of roosters on the farm. A farmer rearing fowls for table purposes needs to raise the class of poultry that is in greatest demand. There are times (as during the present period of shortage of feed and materials for housing poultry) when every poultry raiser should be sure that the class of chicken which he is rearing is suitable for the branch of the industry in which he is engaged.

With the production of table poultry, sex linkage of poultry may be practised as a method of the determination of the sex of chickens, as in this case breeds capable of producing cockerels and pullets distinguishable at day-old by their markings may be used. However, table poultry raising in Queensland is not an extensively specialized business, but is conducted more as a sideline to commercial egg production. The White Leghorn and the Australorp, the two main breeds in this State, are not suitable for the production of sex-linked chickens. Therefore, as a method of sex determination, sex-linkage is not practised to any extent.

The determination of the sex of day-old chickens by examination of the rudimentary genital organs was first perfected in Japan in 1927, but it was not until 1933 that it was introduced into other countries. Canada was one of the first to adopt this method. In 1934, a Japanese expert visited Australia and gave demonstrations and instruction. However, because of the fact that food supplies were plentiful, and material for accommodation could be purchased, the need for strictly adhering to one class of poultry raising was not followed and the determination of the sex of day-old chickens did not gain the immediate popularity which it did in other large poultry raising countries.

During the war, the poultry industry expanded both in the production of eggs and table poultry. The present shortage of building material and fodder now make it a necessity for a farmer to raise only the class of poultry for which his farm is established.

The determination of the sex of day-old chickens requires considerable skill. To the average person there is no visual difference between a pullet and a cockerel day-old chicken. Unscrupulous persons took advantage of this fact and sold cockerel day-old chickens to unsuspecting buyers who thought that they would ultimately rear an equal number of pullets and cockerels. With the object of protecting the hatcheryman, the sexer and the buyer the *Diseases in Poultry Acts* were amended to provide for the licensing of persons competent to determine the sex of day-old chickens and for the branding of chickens determined as cockerels with an indelible stain. This legislation has now been superseded by *The Poultry Industry Act of* 1946, under which new sections have been included providing for the control of sexing and the licensing of persons qualified to determine the sex of day-old chickens.

How the Purchaser is Protected.

It is necessary for all persons practising the determination of the sex of day-old chickens to be licensed and such license is only issued after proof of qualification by examination to determine the sex of day-old chickens has been given. Under the *Poultry Industry Act* it has been provided that licenses shall be of two classes—first and second. A first class license shall only be issued to a person who has gained a 95 per cent. pass or better, in an examination conducted on 200 chickens. However, this degree of accuracy must be obtained in both the cockerels and pullets as classified by the candidate. A second class license may be obtained by gaining a 90 per cent. pass, or better, at an examination on 100 chickens.

All chickens determined as cockerels by a person licensed to determine the sex of day-old chickens must be sprayed by him with an indelible violet spray immediately on sexing. It is an offence under the Act to stain any but cockerel chickens, and should any of a batch of chickens be indelibly stained with a violet stain, then the container holding the chickens must carry a label stating definitely how many of each sex are included in the batch. For all varieties of chickens the violet stain was found most suitable, and although in some instances, such as on black chickens, the stain is not so easily discernible, there are usually patches of white fluff on all chickens on which the stain can be observed, and if there is any doubt by the purchaser as to the sex of a particular lot, the chickens should be carefully examined.

Furthermore, it is now provided under the Act that the vendor must supply a written statement as to the sex of the day-old chickens sold by him. This information may be set out on the receipt, but must definitely state whether the chickens are day-old chickens (that is, chickens of mixed sex), pullet, or cockerel day-old chickens. In the event of either cockerel or pullet day-old chickens being offered for sale, the vendor must also supply the purchaser, on demand, with the name of the person who determined the sex of such chickens.

At the present time, in the case of the sale of pullet day-old chickens, the vendor shall also guarantee that at least 90 per cent. shall be pullet chickens.

The Practice of Sex Determination.

It is not easy to acquire the skill necessary to accurately determine the sex of day-old chickens, and unless one is prepared to devote the time necessary and has the facilities and continuity of the supply of day-old chickens for the purpose of practice, it is not recommended that he may give this work any attention or consideration, as it is more economical to engage the services of a qualified person than to have the work done unsatisfactorily.

Under the *Poultry Industry Act*, it is an offence for any person who is not licensed to engage in this work.

Points in Sex Determination.

For those who wish to make a study of the determination of the sex of day-old chickens it is desired to state some of the essentials for success and the problems which have to be mastered.

To become proficient in the determination of the sex of day-old chickens one must first of all have good eyesight. This is essential because of the minuteness of the genital eminence. A strong light of from 150 to 200 watts at a height convenient to the operator is a necessity. The light, of course, should be shaded so that the rays are directed on to the chickens and do not shine in the operator's eyes. The room in which chickens are sexed should not be well lighted, as it is necessary for the strong artificial light to be concentrated on the chickens.

A careful study has to be made of the genital eminence for, although all males have a genital eminence and half the females have none, the other females have an eminence which may be confused with that of the male. The genital eminence develops in both sexes up to the fourteenth day of incubation, but in the female, after this period, it gradually shrinks, while in the male it remains normal. In the case of some females the shrinkage of the eminence is only partial, and some females therefore have an eminence similar to though smaller than the male. In other females, the rigidity of the eminence abates and the chicken is thus seen with a fairly large fold in the lining membrane which gives the appearance of a large flabby eminence.

Authorities divide the genital eminence in the case of male chickens into six groups, while the females are only grouped into three. Type A of the male constitutes approximately 75 per cent. and types B to F approximately 5 per cent. each of the remainder, type D being the most numerous, constituting, at times, up to about 6½ per cent. Female type A constitutes up to 60 per cent. of the females, and B and D types 37 and 3 per cent. respectively.

Types of Eminences.

Following is a brief description of the various types of males and females:—

Male.	*Female.*
A. Eminence comparatively large and well defined, rising abruptly from the surrounding folds.	A. No eminence is present at all in this type.
B. Much smaller than type A, and yet fairly firm and well defined.	B. Very much like the male, but the eminence is smaller, and well defined. Situated on the inside of the second fold.
C. Somewhat tongue-shaped and situated nearer the outside of the cloaca than A and B.	C. Nil.
D. Consists of a large flattened eminence fused with the surrounding folds.	D. Also resembles the male type, being fairly large, but does not stand so erect from the surrounding folds.
E. Is elongated and thin and in some cases reaches the first set of folds.	E. Nil.
F. Is really a double eminence.	F. Nil.

Although it is difficult for beginners to differentiate between the female and male eminences, it is possible, after learning how to handle the chick and evert the cloaca, to successfully sex chickens with about 70 per cent. accuracy, since the A type in males and females constitutes about 75 and up to 60 per cent., respectively.

After practice, however, it is possible to distinguish the sexes with a greater degree of accuracy, as the female eminence does not stand out as clear or erect as the male types and is more or less of a flabby nature. By passing the finger across an eminence of a male it will show out much firmer than the eminence of the female, although with the female type B the eminence while tending to flatten enlarges somewhat. However, decisions should be made quickly and if any doubt exists the chicken should be replaced and looked at again a little later.

Post Mortem Examination of Chickens.

Post mortem of doubtful chickens is an advantage, as it is possible by this means to impress on the beginner the variations in types of eminences. Chickens are usually killed for post mortem by pressing the necks against a sharp-edged box or table, although some dislocate their necks by pressure with the thumb nail against the neck of the chicken and the index finger, gently pulling the chicken's body with the other hand.

When the chicken is dead, take the head between the first and second fingers and spread the body across the hand, placing one leg between the thumb and finger and the other between the little and third fingers. Next tear off the skin and fluff, exposing the abdominal wall. The thumb and index finger can then be used to tear the abdominal wall, and by pushing the yolk and intestines to one side the testes or ovary can easily be distinguished lying at the anterior end of the kidneys immediately over the backbone. In the male chick the testes are situated one on either side of the backbone and are small, elongated, bean-shaped organs of a pale yellowish colour. There is only one ovary present in the normal day-old chicken, this being situated on the left side of the body. It is rather a star-shaped body and appears to be embedded in the kidney tissue.

Handling of Chickens.

Unless a person has practised the holding of the chicken and evacuation of the cloacal contents, it is useless proceeding further in the determination of sex.

A person should have nimble fingers and be able to handle chickens expeditiously and carefully in order that they may not be injured in any way. It matters little how the chickens are held provided they are held firmly yet gently, and if the little and third fingers are passed on either side of the neck as a method of holding, care should be exercised not to strangle the chicken.

The cloaca should always be emptied before examination. This is done by applying sudden yet gentle pressure on the abdomen of the chicken. The first two fingers of the free hand, or the index finger and thumb, are then used in conjunction with the thumb of the hand holding the chicken to evert the cloaca and thus expose the genital eminence. However, care should be taken not to exert too great a pressure on the parts, as the intestinal tract may be protruded over the genital eminence, thus making the determination of sex more difficult. The genital eminence is situated on the lower edge of the cloaca.

REGISTERED HATCHERIES

REGISTRATION of poultry hatcheries entails blood testing and the removal of birds found to be affected with pullorum disease, or are otherwise unsuitable for breeding purposes.

Owner.	Name of Hatchery.	Breeds.
V. H. Allen, Oxley road, Oxley	Alaura	White Leghorns, Australorps, Langshans, and Rhode Island Reds
I. M. Armstrong, Randall road, Wynnum West	Chanticleer	Australorps
P. R. Bach, Cleveland		Australorps and White Leghorns
Mrs. E. A. Baltzer, 10 Mary street, Toowoomba	Austral	White Leghorns
J. S. Bauer, Oakwood, Bundaberg	Triangle	Australorps and White Leghorns
Beach Bros., Wellington Point	Brach Bros.	Australorps and White Leghorns
J. M. Beccaris, Harvey's Range road, Townsville	Winova	Australorps, White Leghorns, and Rhode Island Reds
H. Brazil, Beaudesert road, Cooper's Plains	Brazil's	Australorps and White Leghorns
D. L. Burns, Brisbane road, Redcliffe	Yalta	White Leghorns and Australorps
P. J. C. Bygrave, Robinson road, Aspley	Craigan Farm	White Leghorns and Australorps
M. H. Campbell, Albany Creek, Aspley	Mahaca	White Leghorns and Australorps
W. Carr, A. B. and A. T. M. Watson, Logan and Creek roads, Mount Gravatt	Bellview	Australorps, White Leghorns, Minorcas, and Rhode Island Reds
J. L. Carrick and Son, Manly road, Tingalpa	Craigard	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton	White Leghorns
A. R. Chard, Chard's road, Bundaberg	Sunnyland	Australorps and White and Brown Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
A. Cowley, The Gap	Melody	White Leghorns and Australorps
A. J. Daniels, Moongan	Daniel's	White Leghorns, Australorps, Anconas, Brown Leghorns, and Rhode Island Reds
T. Duval, New Lindum road, Wynnum West		Australorps and White Leghorns
E. Dearling, Haden		White Leghorns and Australorps
V. R. Dearling, 85 Holberton street, Toowoomba		White Leghorns, Australorps, and Brown Leghorns
Dixon Bros., Wondecla	Dixon Bros.	White Leghorns
E. Eckert Head street, Laidley		Australorps, Langshans, and White Leghorns
A. W. Edwards, Stenner street, Middle Ridge		Australorps and White Leghorns
C. L. Eggar, Moggill	Rosehill	Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner	Australorps
Elks and Sudlow, Beerwah	Woodlands	White Leghorns and Australorps
W. Ellison. junr., Bald Knob, Landsborough	Willeden Plantation	White Leghorns and Australorps
B. E. W. Frederich, Oxley road, Corinda	Glenalbyn	Australorps
N. H. Gibson, Manly road, Tingalpa	Gibson's	Australorps and White Leghorns
Gisler Bros., Wynnum	Gisler Bros.	Australorps and White Leghorns
R. T. Green, 116 North street, Toowoomba		White, Black, and Brown Leghorns, Australorps, and Langshans
W. G. Gregory, Deeragun	Rocks	White Leghorns, Australorps, and Rhode Island Reds
T. L. Griffiths, Margaret street, Silkstone, Ipswich	Hillcrest	White Leghorns and Australorps
J. W. Grigg, Tumoulin		Australorps and White Leghorns
F. P. Grillmeier, Milman	Mountain View	Australorps and Minorcas
T. A. Haggquist, Edmonton	White Rocks	White Leghorns
P. E. and G. G. Hannay, Ridley road, Aspley	Sunnyhill	White Leghorns and Australorps
C. Hartmann, Box 73, Pittsworth	Vigor	Australorps, White and Black Leghorns
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
L. G. Higgins, Middle Ridge, Toowoomba		Anconas, Rhode Island Reds, and White Leghorns
F. E. Hills, Sims road, Bundaberg	Littlemore	Australorps, Rhode Island Reds, White Leghorns, White Wyandottes, and Langshans
A. H. Hillenberg, Crow's Nest		Australorps
Hodgen Bros., Spring street, Middle Ridge	Austral	White Leghorns and Australorps
A. E. Hoopert, 24 Greenwattle street, Toowoomba	Kensington	Australorps and Rhode Island Reds
H. Hufschmid, Ellison road, Geebung	Meadowbank	White and Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds

REGISTERED HATCHERIES—*continued.*

Owner.	Name of Hatchery.	Breeds.
Mrs. E. R. Hurren, 44A Herries street, Toowoomba	..	White Leghorns and Australorps
H. Jones, Ridgelands	Jolly Farm	Langshans, Australorps, White Leghorns, White Wyandottes
A. J. F. Jull, Stradmore, Ramsay street, Middle Ridge	Stradmore	White Leghorns
W. Kelly, Parkhurst, via North Rockhampton	..	White Leghorns, Australorps, and Rhode Island Reds
R. H. Kennedy, 357 Bridge street, Toowoomba	..	White Leghorns, Australorps, and Rhode Island Reds
F. E. Kipee, 40 Hurlsey road, Toowoomba	..	White Leghorns
E. C. Kolberg, Handford road, Zillmere	Gerbera	Australorps
F. Le Breton, Bald Knob, via Landsborough	Pagoda	White Leghorns
W. A. Lehfeldt, Kalapa	Lehfeldt's	Australorps
W. A. Luke, 108 Russell street, Toowoomba	Downs	White and Brown Leghorns, Australorps, and Rhode Island Reds
J. McCulloch, White's road, Manly	Hindes	White Leghorns and Australorps
A. Malvine Waterworks road, The Gap	Alva	White Leghorns and Australorps
A. Mawhinney, Robinson road, Aspley	Aspley	White Leghorns, Australorps, and Rhode Island Reds
Mrs. P. W. E. Maynard, Doonside, via Dalby	..	Australorps and White Leghorns
W. S. MacDonald, Babinda	Redbird	Rhode Island Reds and Anconas
F. Maxfield, 60 Holberton street, Toowoomba	Braeside	White Leghorns
C. J. Mengel, New Lindum road, Wynnum West	Mengels	Australorps
F. J. Miller, 305 Bridge street, Toowoomba	Rhode Island Red	White Leghorns
J. A. Miller, Racecourse road, Charters Towers	Hillview	White Leghorns
H. H. Millman, Haly street, Kingaroy	Kingaroy	Australorps, White Leghorns, Wyandottes and Plymouth Rocks
F. S. Morrison, Kenmore	Dunglass	Australorps
C. J. Nielsen, Kensington street, Bundaberg	Bona Vista	Australorps, Rhode Island Reds, and White Leghorns
S. V. Norup, Beaudesert road, Cooper's Plains	Norups	White Leghorns and Australorps
H. Obst and Sons, Shepperd	College Holme	White Leghorns and Rhode Island Reds
H. W. and C. E. E. Olsen, Marmor	Squaredeal	White, Black, and Brown Leghorns, Anconas, and Australorps
E. E. Palmer, Greenmount	..	Rhode Island Reds
A. C. Pearce, Marlborough	Marlborough	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell and Runner Ducks, and Bronze Turkeys
W. J. Perkins, 110 Dearling street, Toowoomba	Rhode Island Red	Rhode Island Reds
A. J. Philp, Upper Sheridan street, Cairns	Aerodrome	White Leghorns, Australorps, Rhode Island Reds, Anconas, and Light Sussex
G. Pitt, Box 132, Bundaberg	Pitts'	White Wyandottes, White and Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
Mrs. M. Price, care Post Office, Macalister	..	Australorps and White Leghorns
F. M. G. Proellocks, 81 Herries street, Toowoomba	Vale View	White Leghorns
J. C. and G. E. Raff, Musgrave road, Sunnybank	Brundholme	White Leghorns, Australorps, and Rhode Island Reds
G. R. Rawson and Son, Mains road, Sunnybank	Sunbeam	White Leghorns, Australorps, and Black and Brown Leghorns
C. G. A. Rivers, Tamaree	Tamaree	Rhode Island Reds and White Leghorns
C. Roberts, Trout road, Aspley	..	White Leghorns
J. Rogoff, 423 Logan road, Stone's Corner	Kingston road	Australorps
C. L. Schlencker, Handford road, Zillmere	Windyridge	White Leghorns and Australorps
P. H. Scotney, Priest street, Toowoomba	..	White Leghorns and Rhode Island Reds
J. Schumann, 291 Bridge street, Toowoomba	..	White and Brown Leghorns, Rhode Island Reds, and Australorps
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa	White Leghorns and Australorps
N. G. Seymour, Ipswich road, Darra	Sohufa	White and Black Leghorns and Australorps
R. E. Slaughter, Handford road, Zillmere	Monarch	Australorps and White Leghorns
H. A. Springall, Progress street, Tingalpa	Springfield	White Leghorns
A. W. Stehn and Son, 285 West street, Toowoomba	Red Spot	Australorps, Rhode Island Reds, White and Brown Leghorns
J. P. Skelly, Helidon	Helidon	Australorps and White Leghorns
W. B. Slawson, Fraser road, Mitchelton	..	White Leghorns, Australorps, and Light Breeds
T. Smith, Isis Junction	Fairview	White Leghorns and Australorps
P. W. Stark, Crow's Nest	Austral	Australorps
H. M. Stephens, 160 Barolin street, Bundaberg	Barolin Stud	Australorps and White Leghorns
J. Stevenson, Dragon street, South Warwick	Ivanhoe	Rhode Island Reds, White Leghorns, and Australorps

REGISTERED HATCHERIES—*continued.*

Owner.	Name of Hatchery.	Breeds.
R. Stockman, Kairi	Tinaroo	White Leghorns and Rhode Island Reds
A. H. Tebbutt, Stewart terrace, Gympie	Delrae	White Leghorns, White Wyandottes, and Australorps
A. G. Tietzel, West street, Aitkenvale, Townsville	Tietzel's	White Leghorns and Australorps
R. M. Thomson, Parkhurst, North Rockhampton	..	Australorps
H. G. Thorpe, Box 36, Goomeri	Thorburn	White Leghorns, Australorps, and Rhode Island Reds
G. L. Vogler and M. E. Hooper, Kenmore	Stonehenge	White Leghorns and Australorps
W. Warren, Progress street, Tingalpa	..	White Leghorns and Australorps
N. J. Watson, Lister street, Sunnybank	Glencoe	Australorps and White Leghorns
Mrs. V. M. White, Archerfield road, Darra	Viola	White Leghorns and Australorps
P. A. Willson, Board street, Deagon	Myara	White Leghorns and Australorps
G. A. C. Weaver, Herberton road, Atherton	Weaver's	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams
F. H. J. Weeks, Bajool	Glen Brae	White Leghorns and Australorps
Miss I. G. Winter, 761 Ruthven street, Toowoomba	..	White Leghorns
Miss L. M. Wooller, Huet street, Rockhampton	Riverview	Rhode Island Reds, White Leghorns, and Australorps
P. A. Wright, Laidley	Chillowdeane	White and Brown Leghorns and Australorps
A. Wruck, Main road, Upper Brookfield	Wrucks	White Leghorns and Australorps

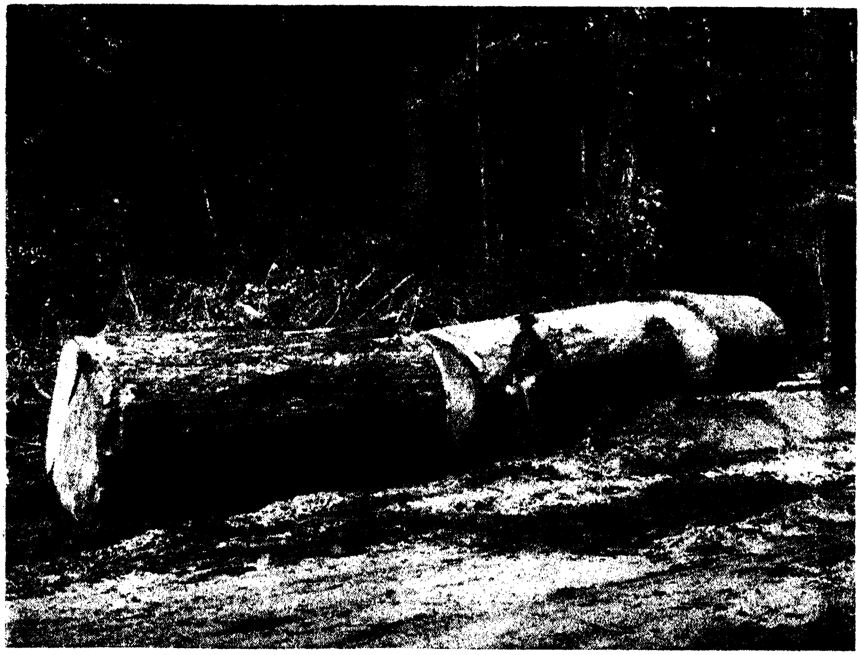


Plate 21.

KAURI LOGS IN A NORTHERN JUNGLE, NEAR DANBULLA, QUEENSLAND.

ANIMAL HEALTH

Blackleg in Cattle.

A. K. SUTHERLAND, Veterinary Officer, Animal Health Station, Yeerongpilly.

BLACKLEG in cattle is known in many countries throughout the world and in Queensland is widely distributed in both the beef and dairy cattle areas. Outbreaks can cause serious mortalities. These losses, however, can be avoided as the disease is not difficult to recognise and can be prevented by vaccination.

Cause.

Blackleg is caused by infection with a bacillus, *Clostridium chauvoei*. This micro-organism produces minute seed-like bodies, known as spores, which are very resistant and can survive in the soil for long periods. The disease is common in some regions and rare or unknown in others, its distribution apparently depending on whether the soil is favourable or otherwise to the survival of the spores.

Infection probably takes place when soil containing spores is swallowed during grazing. The bacillus grows in the muscles and produces a poison which circulates in the blood and soon kills the animal

Animals Affected.

Blackleg is a disease of calves and weaners. It attacks animals in any condition, but it is often the best conditioned animals which are affected. It is essentially a disease of young cattle and is rarely seen in animals over two years of age. It is not known why young cattle are susceptible to the disease whilst adults are resistant.

Sheep and goats are also susceptible to blackleg due to *Cl. chauvoei*. The disease occurs fairly extensively among sheep in western Queensland. Sheep of all ages may be affected but sheep under 2 tooth are most susceptible. Most of the outbreaks which have come under observation in Queensland to date have been confined to rams. The preventive measures described here for cattle are equally effective in sheep.*

Symptoms.

Blackleg kills very quickly and, as a rule, attention is first drawn to outbreaks by the presence of dead animals. If an animal is seen before death, it is usually isolated from the mob and lame in one or more limbs. Closer examination will generally reveal a swelling of the muscles of some part of the body. If the swelling is pressed it may crackle. The animal is fevered and soon becomes prostrate and dies in a day or so.

Post-mortem Examination.

The carcase of an animal which has died from blackleg becomes very swollen soon after death. However, it should be remembered that in the high temperatures of summer, the carcase may swell rapidly after death, simply as a result of decomposition.

---

* See this Journal, Vol. 62, Part 1, page 15 (Jan., 1946) for article on blackleg in sheep.

The characteristic feature of blackleg is the rapidly developing swellings which occur in the muscles, usually of the limbs, but sometimes also of the neck, body or cheek. The skin over these swellings may be dry and parchment-like (gangrenous) and, beneath the skin there is usually an accumulation of yellowish and perhaps blood-stained fluid. The affected muscle is swollen and dark with black or blood-stained patches in it. Bubbles of gas may be present in the muscle tissue or in the fatty tissue between the muscles. The diseased area has a rather distinct sour smell, not unlike rancid butter. It is important that the carcase be examined soon after death otherwise changes in the muscles due to putrefaction may be mistaken for blackleg. When blackleg is suspected, the examination should be thorough and all the muscles sliced and inspected.

Other abnormalities which may be present in a case of blackleg are engorgement of the skin and internal organs with dark blood, hæmorrhages of the heart and lungs, a swollen and friable liver and fluid in the chest and abdominal cavities. However such changes may also be found in diseases other than blackleg. There are usually no abnormalities in the spleen and the blood clots normally.

Diagnosis.

When cattle under 18 months of age die suddenly, blackleg should be suspected. It is important that a correct diagnosis be established without delay so that the remaining calves in the mob can be vaccinated to prevent further losses. A post mortem examination should be done as soon as possible after death and the muscles examined for the lesions described above. The nearest Inspector of Stock or Veterinary Officer should be consulted for advice and assistance.

Prevention.

Treatment of animals affected with blackleg is futile, but the disease can be prevented by vaccination. Considerable resistance to blackleg is obtained by inoculation of calves with several products which are on the market. The strongest and most durable immunity is obtained by inoculation with liquid vaccine which is prepared from cultures of the blackleg bacillus. This type of vaccine (referred to in America as a bacterin) contains no live organisms and is therefore quite safe. Fifty doses of the recommended Australian-made vaccine cost 11s. in Brisbane. The various types of aggressins and solid and pellet forms of immunising agents have been superseded by liquid vaccines or bacterins.

When a case of blackleg occurs, every animal under two years of age in the herd should be vaccinated immediately. Immunity takes about 14 days to develop (so deaths may continue up to 14 days after vaccination). On properties where the disease is known to exist calves should be vaccinated annually. Even though no cases have been observed for some time, vaccination should be carried out, because the bacillus can persist in the soil for long periods. Blackleg spores in the soil may eventually die out if all calves are vaccinated every year for a number of years after the last case of blackleg.

The carcases of all animals which have died from blackleg should be completely burnt. The top soil for several feet around the carcase should be shovelled into the fire. Dead animals in which the disease is only suspected should be treated in like manner. These steps are necessary to prevent infection of the soil with blackleg bacilli.

Age to Vaccinate.

On most properties where blackleg vaccination is a routine procedure, the calves are vaccinated at branding time and this usually prevents losses. However, this practice may not be effective in all districts because the age of calf and the season of the year in which blackleg is prevalent, as well as the time of branding, all vary in different parts of the State. When deciding the age and the season at which to vaccinate calves, important facts to remember are—

(*a*) There is no appreciable immunity until 14 days after vaccination.

(*b*) Immunity is strongest three to four weeks after vaccination.

(*c*) Thereafter the immunity gradually becomes weaker so that, even with the best vaccines, animals may be unable to resist natural infection 10 to 12 months after vaccination. Thus calves which are vaccinated when they are six months old or younger may require a second dose of vaccine at 12 months on properties where the disease is prevalent.

Technique of Blackleg Vaccination.

The vaccine is injected subcutaneously (that is, beneath the skin) with a hypodermic syringe. The dose of the recommended liquid vaccine is 5 cubic centimetres. The manufacturers usually issue printed instructions with each bottle and these should be followed carefully.

Any 5 or 10 cubic centimetre syringe fitted with a stout needle about 1½ inches long may be used. The Pound's and Record type syringes are the most popular. When a large number of calves are to be vaccinated, an automatic syringe which will deliver 5 cubic centimetre doses will expedite the work. The latter also has the advantage that the vaccine is delivered direct from the bottle to the syringe through a rubber tube so that contamination by dust is avoided. However, automatic syringes are a little more expensive and require more care to keep them clean and in good working order.

The syringe, needles and containers used for inoculating stock should be sterile. Carelessness in this regard may lead to tetanus, abscesses or blood poisoning (septicæmia), as the organisms causing these diseases can be introduced by dirty instruments. Losses from these diseases following careless inoculation against blackleg, tick fever, or other disorders, have occasionally been serious. The safest way to sterilise syringes, needles and containers is to place them in cold water, bring to the boil then boil for 10 minutes. Needles and containers should be sterilised in this way, but as most syringes for veterinary use would not stand up to boiling, the following method is advised:—

1. Clean the syringe thoroughly with soap and water and then soak it for 24 hours before use in a disinfectant, such as 5 per cent. lysol or cyllin. Methylated spirit is not a reliable disinfectant for this purpose. Immediately before use rinse thoroughly in water which has been boiled and cooled. This is to remove all traces of disinfectant which may interfere with the vaccine.

2. Sterilise a number of sharp needles by boiling them in water for 20 minutes.

3. Change the needle frequently when vaccinating a mob of calves. Needles not in use should be kept in a dish of weak disinfectant. Discard any needle which becomes contaminated with manure or soil. The soil of stock yards is especially liable to contain tetanus spores which can be destroyed only by boiling.

4. The vaccine should be poured from the bottle into a container such as an enamel mug which has been sterilised by boiling. The vaccine and all instruments when not in use should be covered with a clean cloth to prevent contamination by dust.

It is particularly desirable that these precautions be observed in districts where cases of tetanus are known to have occurred in horses, sheep or cattle.

Animals showing any signs of blackleg should not be vaccinated otherwise the needle may become contaminated with blackleg bacilli which might then be inoculated into healthy cattle.

The usual sites for inoculating cattle are either the loose skin behind the shoulder or the side of the neck. The needle is pushed into the loose tissue under the skin, but not into the flesh, and the dose injected slowly and steadily. The skin should be pinched together as the needle is withdrawn to prevent leakage of vaccine. Needless to say inoculation is usually done with the cattle in a well-filled race, but calves may be done when they are cast for branding or marking.

CALVES COME FIRST—TO STINT IS TO STUNT.

It is argued that a calf is influenced in its development more by what it is fed than by how it was bred—in other words, the balance is somewhat in favour of feeding as against heredity. That idea, of course, has particular reference to calves being reared for future breeding purposes. The way in which stock intended for slaughter are reared cannot affect future generations of cattle, although it may affect the owner's pocket.

It is contended that future generations of dairy stock are profoundly affected, for better or for worse, by the way in which heifer calves are fed. Signs of bad rearing are fairly common—large heads, pot-bellies, swamp-backs and donkey-rumps, to mention a few. Such calves will never grow into good milkers; their constitution and general make-up being spoilt by lack of wisdom in their rearing. It would not be so bad if such carelessness in rearing were confined to the cows themselves, but in the nature of things some of the defects may come out in the offspring. That is the trouble.

In rearing a calf as a future breeder, the opinion is that the youngster should have plenty of milk for the first three months of its life, if not for longer. Other recognised calf foods, bought or home-produced, also should be liberally fed. After all, there is only one growing period in the life of a calf and during that period it should get full and plenty of the best food available. To stint a calf in its feeding is to stunt it in its growth. The aim should be to bring into the herd heifers that are in every way better animals and potentially better producers than their mothers. That, of course, is another aspect of a long-term farming policy, but then all farming is a long-range business. Only when the art of rearing calves as future milk producers in a dairy herd is better understood, and applied, can we hope to see that really outstanding improvement in the standard of our dairy herds which is so much desired. Calves should not be mistaken for bushel bags in which to tumble rubbish.

Leucosis in Poultry.

PARALYSIS, BIG LIVER, WASTING AND PEARL-EYE DISEASES.

L. G. NEWTON, Veterinary Officer.

THE term "leucosis" has come into general use to cover a group of disease conditions of poultry previously known under many headings, including fowl paralysis, neurolymphomatosis, big liver disease, wasting disease, and pearl eye. Most of these names were used because they described a particular symptom of the disease, and, as one or another form predominated or occurred alone in an outbreak, each was looked upon as a separate disease and much confusion arose in their classification. They are now regarded as different manifestations of one disease—leucosis—because transmission experiments have shown that material from one form of the disease may give rise to any of the others.

Occurrence.

Leucosis has been reported from most parts of the world where poultry is kept. It is considered so serious in some countries that laboratories have been set up to devote their full time to its study. It is widely spread in Queensland and because of its increased prevalence over the past decade must be regarded as one of the major poultry diseases in this State.

Cause.

The disease is thought to be due to a very small organism known as a *virus*. The flock is rendered more susceptible to an attack of the disease by any factor which causes a lowering of resistance or vitality, for example, deficiencies of diet, sudden changes in management, the presence of other diseases, and commencement of laying. These are called predisposing causes.

Course of the Disease and Method of Spread.

It is not known definitely how the disease is contracted or spread under natural conditions. Experimentally it has been shown that it can be spread by external parasites and through the droppings. It has also been established that chickens, during their first few weeks of life, are more susceptible to infection than older birds. Following infection, a long period may elapse before the appearance of symptoms and lesions and often the onset of the disease only takes place subsequent to a setback due to some predisposing cause such as those mentioned above.

An outbreak may persist in a flock for several months; in some cases deaths may be so sporadic that their significance is not realised; less commonly, when the disease is acute, heavy mortalities occur over a few weeks.

The symptoms and lesions usually develop slowly and their nature is sometimes such that, apart from physical disability, the bird suffers little. In these cases, death may eventually occur from starvation following blindness or advanced paralysis. During this period, affected birds are more susceptible to other diseases; for example, parasite infestation may flare up and cause heavy losses. On the other hand, when vital centres are involved, such as the nerves supplying the heart or lungs, death may occur suddenly.

Symptoms and Lesions.

The essential change in leucosis is the invasion or multiplication of abnormal cells resembling immature lymphocytes, a type of white cell found in the blood stream in the various organs or tissues of the body. According to the location of these cells, the disease may be considered under the following groups:—

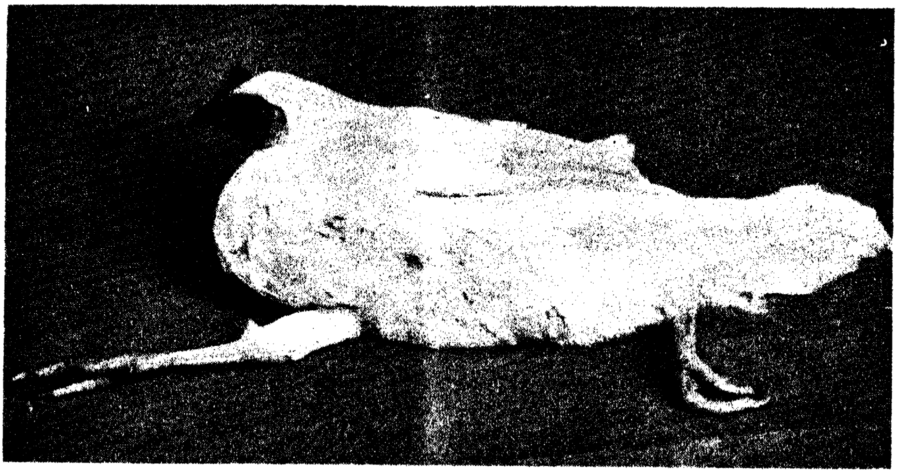


Plate 22.

A TYPICAL CASE OF PARALYSIS OF THE LEGS DUE TO LEUCOSIS.—The bird appears bright and otherwise healthy.

(*a*) *Nerve involvement.*—This group includes cases of paralysis of the legs, "dropped" wings, twisting of the neck, pendulous and crop bound conditions, and sometimes greenish diarrhœa. These conditions occur as a result of disturbed or reduced functions of the nerves supplying the various parts following invasion by the abnormal cells.

(*b*) *Eye lesions.* These are produced by a gradual infiltration of cells into the iris until the characteristic "pearl eye" develops. In the early stages, the eye appears swollen and later the iris is thickened and grey in colour and the pupil becomes smaller and irregular in shape. In advanced cases, the pupil remains simply as a pin point, and does not respond to light. Eye lesions are usually the commonest type seen in an outbreak. In the early stages, the condition must not be confused with lack of pigment in young birds.

(*c*) *The Visceral type.* In this case, any organ of the body may be involved but most commonly the effects are seen in the liver. Changes in this organ vary from groups of cells visible only under the microscope or larger masses causing greyish flecking to a tremendous enlargement in which almost the whole of the liver tissue is replaced by abnormal cells. This latter condition is referred to as "big-liver."

In other cases, the lesions may resemble tumour formation, ranging from pea-like nodules to growths the size of a tennis ball. These arise particularly in the ovary, and may extend through other parts of the body.

In addition to the above effects, other general changes may be seen in an outbreak including wasting, stunted growth in growing birds, and sometimes gross thickening of the bones, &c.

Diagnosis.

The presence of the disease on a farm can only be determined from the history, and a thorough examination of the whole flock. A single bird submitted for examination may show gross effects of the disease, yet a negative finding in such a case does not necessarily prove that the disease is absent.

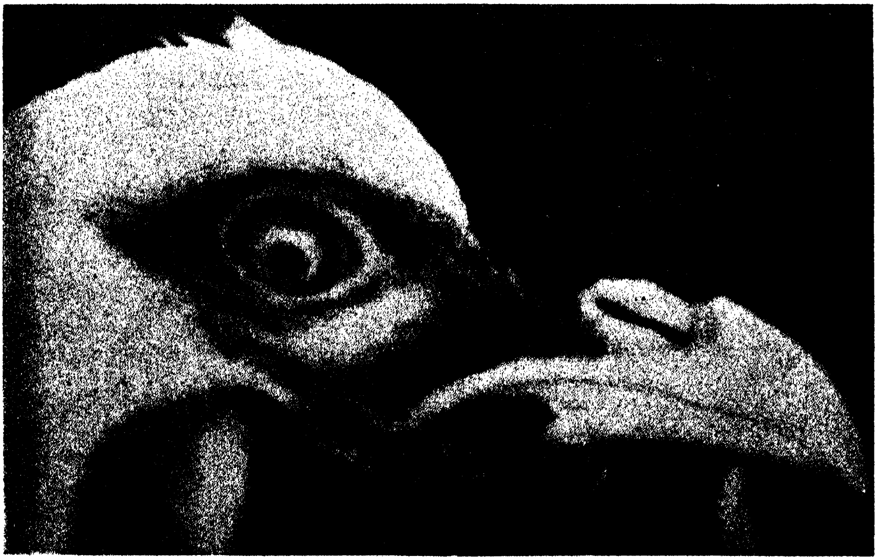


Plate 23.
WHITE LEGHORN HEN SHOWING PEARL EYE.

The important symptoms and lesions which confirm the presence of the disease in a flock are summarised as follows:—

(*a*) *Paralysis of legs or wings, or twitching and twisting of the head and neck*;

(*b*) *"Pearl" eyes, irregular and contracted or dilated pupils;*

(*c*) *Sudden profuse greenish-yellow diarrhœa followed by rapid death;*

(*d*) *Gross enlargement of internal organs, such as liver, spleen, kidneys;*

(*e*) *Spotting or flecking of organs with small grey or white areas;*

(*f*) *Tumorous masses in ovaries, kidneys, &c.;*

(*g*) *Nodular or diffuse enlargement of nerve trunks.*

Economic Importance.

The insidious nature of the disease is its worst feature. An outbreak may persist throughout the whole of the laying season, resulting in unthriftiness, occasional deaths and marked decrease in production.

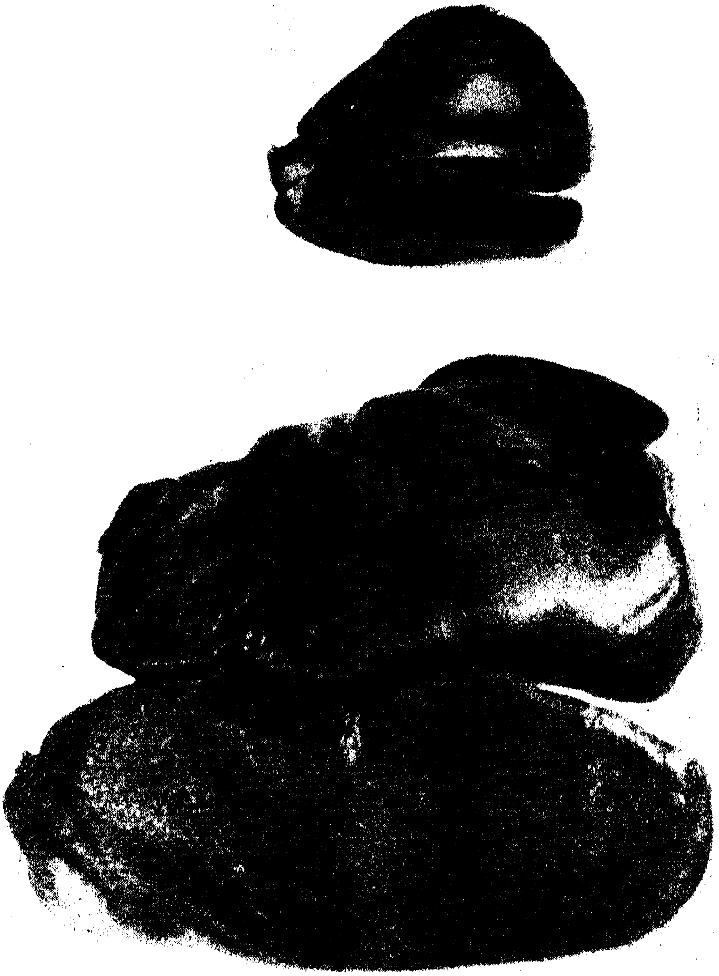


Plate 24.

ENLARGED LIVER DUE TO LEUCOSIS.—Normal liver also shown for comparison in size.

In such cases the real cause of the trouble may be overlooked. On the other hand, the disease may cause a severe mortality following unmistakable symptoms, with production falling very low for some months.

In young birds, growth is seriously retarded and "wasters" develop. Pullets commencing to lay may go into moult and production is lost for some months.

When the outbreak is severe and prolonged, it may be desirable to discard the whole flock rather than continue to suffer loss in both numbers and production.

Control.

In spite of the tremendous amount of investigational work carried out, there is still no specific method of control.

Undoubtedly the indiscriminate flock mating practiced at present by commercial poultry raisers has been responsible for a great increase in the disease. Firstly, as there is no close examination of individual birds, well developed clinical cases may be found in the breeding pen. As there are grounds for believing that the disease is transmissible through the egg, the danger of this practice is evident. Secondly, with pullet breeding, birds with weak constitutional stamina may be included in the breeding pens, and break down during the season. Eggs from such birds will be hatched, so carrying on weak or susceptible strains. By using second year or older hens for breeding, the poultryman at least knows that they have come through one year's production successfully. Similarly, when family and individual records can be kept, the behaviour of all breeders can be checked, and susceptible birds and families eliminated. This does not obtain in flock mating.

As it is in the early stages of life that chickens are most susceptible, every effort should be made to prevent their exposure to infection. It should be remembered that the disease may be carried by parasites, clothing, &c., as well as by contact with older birds. The importance of regular cleaning of the pens and rearing of chickens on clean ground away from older stock cannot be too strongly emphasised.

An attack of the disease may be anticipated by close observation of the flock, enabling immediate removal of affected birds and correction of predisposing factors if present.

Control Measures Summarized.

1. *Breed from hens not earlier than in their second year of production selected as carefully as possible for long life and stamina.*
2. *Reject from the breeding pen all birds showing any signs of the disease.*
3. *Rear chickens under conditions of minimum exposure to infection and avoid sudden changes of feed and housing, rough handling, &c., particularly at the commencement of laying.*
4. *If chickens are purchased, obtain them from disease-free flocks.*
5. *When an outbreak occurs, cull heavily.*
6. *If the disease persists and does not respond to culling, dispose of the whole flock for slaughter.*

GENERAL NOTES

Staff Changes and Appointments.

Mr. Harold Pope has been appointed an Adviser on probation in the Sheep and Wool Branch of this Department.

Use of Term "Co-operative."

The Serviceton Co-operative Society of Ex-Servicemen Limited, and the Air Force Co-operative Building Society Limited have been exempted from the operation of the provisions of section 22 of *The Primary Producers' Co-operative Associations Acts,* 1923 *to* 1934, conditionally that any amendments of their rules are approved. This, in effect, means that these bodies are permitted to use the word "co-operative" in the description of their society.

Phylloxera in Grapes.

Under *The Diseases in Plants Acts,* 1929 *to* 1937, a proclamation has been approved, rescinding an earlier proclamation prohibiting the introduction of grapes (fruit) from the Tenterfield district. This action was taken as a result of definite evidence that this district is free from phylloxera.

Control of Brumbies.

Under *The Diseases in Stock Acts,* 1915 *to* 1944, it is provided that where brumbies are a menace to the normal operations of stockowners in any district, that district or portion thereof may be proclaimed an area for the control of brumbies. Following an application from stockowners in the Proserpine district, that district was constituted as a district for the control of brumbies, the onus of the destruction or control of brumbies in the area being on the stockowners who have applied for the constitution of the district.

Elections of Commodity Boards.

Regulations relating to the election of members of commodity boards under *The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1941, have been approved by the Governor in Council. This provides for the elimination of optional preferential voting in all elections of Commodity Boards, and the substitution of straight-out voting.

In addition, regulations under *The Fruit Marketing Organisation Acts,* 1923 *to* 1945, were amended to provide for the election of members of the newly-constituted Vegetable Sectional Group Committee, and straight-out voting also is provided for this election.

New Banana Case.

An amendment of Regulations under *The Fruit and Vegetables Acts,* 1927 *to* 1935 makes provision for the introduction of a smaller banana case, to be known as the "Standard Banana Case." The inside measurements of the new case will be 21 inches long by 12 inches wide by 12 inches deep, with a capacity of not less than 3,024 cubic inches. This case was recently adopted in New South Wales. It is an alternative to the tropical case at present in use, and will greatly facilitate the loading and transportation of cased bananas.

Wild Life Preservation.

An Order in Council has been issued under *The Fauna Protection Act of* 1937, declaring an area on Billa Billa, Goondiwindi, the property of W. Dudley Woods, junr., to be a wild life sanctuary.

Peanut Board.

An Order in Council issued under *The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1941, extends the operations of the Queensland Peanut Board for a further period from 28th August, 1947, to 27th August, 1958.

Rural Topics

The Australian Farmer—Mr. Bankes Amery's Tribute.

A tribute to the part played by the Australian farmer during the war was paid by Mr. Bankes Amery, former leader of the United Kingdom Food Mission to Australia, in a recent broadcast talk. Mr. Amery said that the Australian producer, handicapped by difficulties with manpower, fertilizer, machinery, &c., had done an amazing job in maintaining production of primary commodities at a high figure, and he extended warm congratulations to producers for what they and their wives had done to provide food which was so urgently required.

Mr. Amery pointed out that, although total production of food in Britain had increased greatly during the war, these increases were made chiefly in items such as liquid milk, wheat, barley, oats, vegetables, and potatoes. On the other hand, production of meat, butter, and cheese had declined sharply. Britain was producing 200,000 tons less meat now than she did in 1939, 75 per cent. less butter, and 50 per cent. less cheese. It would be seen, therefore, that the great development made in British agriculture during the war years and afterwards had not done any harm to the market for Australian meat and dairy produce.

''One of the lessons learnt during the war,'' Mr. Amery concluded, ''is the importance of dairy products in the sphere of nutrition. For a long time to come the whole energies of the British dairy farmer will be concentrated on the production of sufficient liquid milk to supplement the national diet, and this will mean that, for many years, the bulk of Britain's requirements of meat, butter, and cheese will have to come from overseas.''

"Iron Rations" Not Good for Dairy Cows.

Here are a couple of recent cases of untimely deaths of valuable dairy cows, caused by too much ''iron'' in the form of scrap metal in their diet. In one cow which was opened up after she had died there was found this collection of ironmongery in her innards:—3 inches of ¼-inch strip metal, 8 inches of fine baling wire, and a lump of lead; also a handful of stones. The post-mortem on the second cow brought to light 9 inches of twisted barbed wire which had penetrated vital organs. The obvious moral is that scrap metal should not be left lying about the farm.

In both cases a deficiency of mineral substances in the pastures probably caused the development of the depraved taste.

No Runts Among the Grunts.

When the cause of unthriftiness in pigs was investigated recently it was found that the pigs had been fed almost entirely on separated milk, apart from what they could pick up, and as the milk supply diminished in the winter, water was added to the separated milk to keep up the quantity given to the pigs.

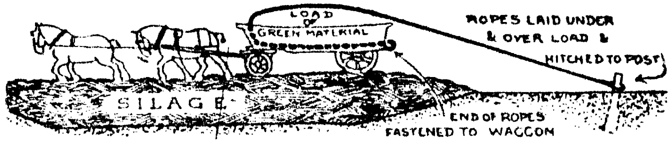
When separated milk is the only food given, a pig 100 lb. live weight drinks about four gallons daily and grows fairly well. If a pig of the same weight were fed dry foods, it would eat about 4 lb. of those foods and would drink about a gallon of water daily. Therefore, the pig on the separated milk diet would be forced to drink about three gallons of liquid more than it required, because there is only about 1 lb. of the equivalent of dry food in each gallon of separated milk. Adding water to the separated milk only means extra work and makes the pig drink unwanted water which retards its growth. When the milk supply is reduced, instead of adding water to it the pig should be given 1 lb. of available solid food to compensate for every gallon short in the separated milk ration. If properly fed, there will be no runts among the grunts.

GADGETS AND WRINKLES

The items on this page have been extracted from a recent notable work "*Handy Farm and Home Devices and How to Make Them,*" by J. V. Bartlett, and published in Adelaide on behalf of the War Blinded Association. Arrangements are in train for early distribution of this very useful book in Queensland.

AUTOMATIC UNLOADING.

The illustration given here is of a very useful method of automatic unloading of silage or hay, etc. Both this and the following idea are somewhat similar in operation in many respects.


LOAD OF GREEN MATERIAL
ROPES LAID UNDER & OVER LOAD & HITCHED TO POST
SILAGE
END OF ROPES FASTENED TO WAGGON

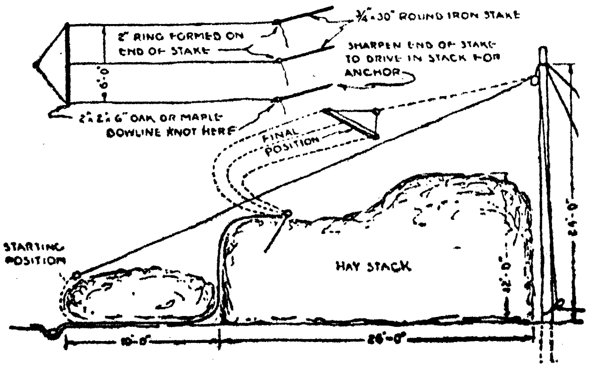
This method is particularly useful for pit silage. By laying ropes along the car, truck or wagon body before loading, the labour of unloading can be greatly reduced, if it is done in the way suggested.

Besides being useful for pit silage, it would also serve the purpose of unloading material at the foot of an elevator or cutter-blower. The idea is clearly shown and quite simple in operation.

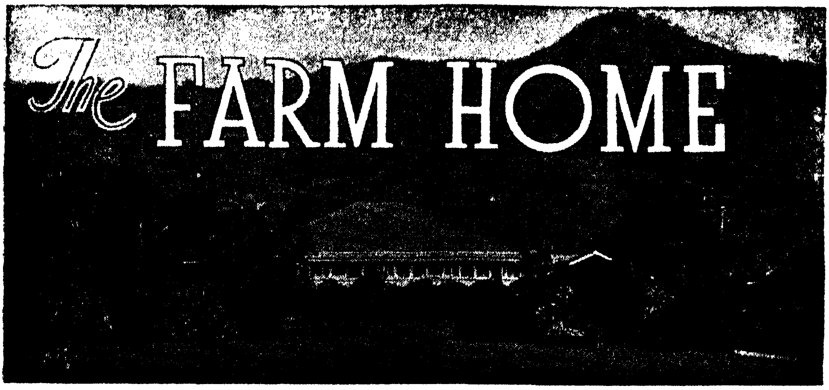
◆

A USEFUL AUTOMATIC ROLL-IN STACKER.

The illustration below is of a useful device tried out by one farmer. In this, three men are required to operate it, one to do the stacking, one to drive the team and arrange the slings, and the other to operate the sweep rake.



The material needed for building this equipment is as follows:—80 to 100 feet of one inch rope; 3 pieces of half-inch rope, 35 to 40 feet long; three iron stakes made of ¾ in. iron bent to form a ring at one end and pointed at the other. One piece of 2 x 2 hardwood, 6 feet long; 3 rings 3 inches in diameter, made of half-inch iron, and two single block pulleys and a telephone pole 25 to 30 feet long. the pole is held in place with guy wire.



Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

CARE OF SICK CHILDREN.

Last month the danger of the common cold was stressed; also the best way of preventing children becoming infected. *Remember, it is better and safer to keep children well, than to try to cure them after they have become sick!* It is criminal to expose a young child to "catching" diseases under the wrong idea that all children must have them sooner or later. However, if a child does show signs of becoming sick with a bad cold, or other infection, here are some practical things to do.

1. Put the child to bed at once and keep him warm. The lowering of resistance caused by chilling may cause bronchitis or pneumonia to develop.
2. See that the child's bowels are well opened.
3. Provide plenty of old clean rags to be used for handkerchiefs. These should be burned afterwards.
4. Keep the nose clear. If the baby is old enough to blow his nose, hold a piece of rag about a quarter of an inch away from the nose and ask him to blow. *Neither nostril should be held closed while the child is blowing.* A young baby should have his nostrils gently cleaned with a piece of cotton wool.
5. Do not force food on the child. As long as he has plenty of water and fruit drinks he will probably be better without too much solid food. If the baby does not digest his milk mixture, it may have to be weakened temporarily.
6. Make breathing easier by adding an extra pillow, so that head and shoulders may be raised.
7. Rub chest and back with warmed oil or similar preparation.
8. If a cold does not show signs of clearing up within two or three days, do not hesitate to call a doctor, and do this at anytime if the child shows signs of fever or is drowsy, develops a rash or cough, or complains of earache.

   Inflammation of the middle ear is a common complication of colds and must be watched for. A baby who has earache will put his hand up to his ear, or rub the affected ear against the pillow, and will cry with the pain.
9. It is sometimes difficult to keep toddlers in bed. Provide some construction toys for them. The Sister at the welfare centre or the director at the local kindergarten will advise about these.

10. Keep the school child at home until the worst of the cold is over. Apart from the risk of his becoming chilled at school he will spread infection amongst his school mates.

Any further advice on this or any other matter may be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau, 184 St. Paul's Terrace, Brisbane,* or by addressing letters, "*Baby Clinic, Brisbane.*" These letters need not be stamped.

◆

IN THE FARM KITCHEN.

Milk Pudding.

Grease a piedish, and at the bottom of it spread a good layer of strawberry jam; cover it with a layer of fine breadcrumbs or plain stale cake crumbs. Beat 2 eggs, and with them mix 1 pint of milk and a few drops of vanilla essence; stir it over a mild heat until it thickens—do not let it boil. Pour this carefully over the crumbs, let the pudding stand for about 15 minutes, and then bake it in a moderate oven for about half an hour.

Tasty Tarts.

These simple tarts are firm favourites and make a pleasant change from ordinary milk or steamed puddings. Sift 2 cups of flour, ½ teaspoon of salt, and ½ teaspoon of baking powder. Rub in two-thirds of a cup of lard until the mixture is like coarse meal. Then lightly stir in 4 tablespoons of cold water. Press lightly together and put away in a cold place for an hour if convenient. Roll out as usual. This is sufficient for two medium-sized pie shells.

Betsy Pudding.

Take a pint milk, 1 egg, 3 oz. breadcrumbs, 1 tablespoon sugar. Spread a good layer of jam at bottom of piedish. Pour milk (nearly boiling) over breadcrumbs. When cool, stir in the well-beaten egg and sugar, and pour gently on the jam. Sprinkle with nutmeg and bake for half an hour in a brisk oven.

Chocolate Tart.

Take 1 tablespoon cornflour, ½ tablespoon cocoa, 1 tablespoon sugar, 1 teaspoon essence of lemon, 2 oz. raisins, 1 cup flour, 1 cup water. Mix cornflour and cocoa together, then blend to a cream with a little of the milk. Bring milk, water and sugar to a boil, pour over the cornflour, return to pan, and boil two or three minutes. Add raisins and essence. Line sandwich tin with pastry, pour the mixture in and bake for 20 minutes.

Potted Veal.

Take 2 lb. knuckle of veal, 2 cloves, pinch mixed herbs, 1 small onion. Cover veal with salted water, add onion and herbs tied in a bag and boil 2½ hours. When tender take out meat, cut small, place in a mould and add 1 cup water in which meat was boiled. Set overnight if possible and serve with salad.

Liver Dumplings.

Mince 1 lb. calf liver very finely after removing skin and sinews, add ¼ lb. chopped suet, salt, pepper, 2 eggs, parsley, finely chopped onion lightly fried in butter, 4 slices of white bread soaked in milk, 4 tablespoons breadcrumbs, 1 tablespoon flour. Mix well, form balls with floury hands, drop immediately in boiled salted water or stock, cover and boil ½ hour. Test one dumpling first; if it falls to pieces, add more flour. Left-overs can be sliced and fried.

Oven Pot Roast.

After seasoning the meat lay pieces of suet, salt pork or bacon over the top. Put the meat on a rack in a roasting pan, cover closely to hold in steam, and cook until tender in a moderately hot oven. This will probably take from 1½ to 2½ hours, depending on the size and tenderness of the cut. About 35 minutes before the meat is done, put pared raw potatoes of medium size into the pan around the meat. Turn the potatoes in the dripping and sprinkle with salt. Cover and cook until meat and potatoes are tender, then remove the lid to allow them to brown before serving. Make gravy of the dripping.

QUEENSLAND WEATHER IN JUNE.

Rainless conditions continued throughout the greater part of the State during the month. Many nil reports were received from Central and South Coast areas and the very light showers in Southern Border districts during an unsettled period towards the end of the month were valueless. Many inland pastoral districts commenced the year after adverse conditions in 1945. Fairly general over-average rains in January effected improvement, but with little or no rain benefit since then conditions have steadily deteriorated. A series of general Spring storms with aggregate totals of appreciable amount, followed by mild weather, are required to re-establish useful pasture and surface water supply. Although far North Coast and South Coast districts inland to adjacent highlands received much surplus rain during the cyclones of February and March, the effects of the dry conditions since then are now noticeable. In the Port Curtis and adjacent highland areas rain relief is long overdue. These districts, under dry conditions for most of 1945, missed any useful benefit from the coastal storms and early rain relief is urgent. In many farming districts of the South-east and Central Coast, absence of rain has also been accompanied by frost damage to growing fruit and vegetables. On the Downs there has been no rain to germinate early-sown wheat, and the waiting time for successful late planting is rapidly diminishing.

Pressure.—Pressure control over Queensland throughout the month was mainly of the fine weather continental anticyclonic type. Although "lows" in southern waters showed energy, particularly round the south-east of the continent and the south-west Tasman Sea, they had little effect on Queensland conditions apart from the usual westerlies in the Southern Border and South-east districts. There was little trough or frontal energy and practically no flow of warm northerly tropical air till the 28th, when an inland depression in Central Australia became associated with a southern "low." This closed depression entered South-west Queensland on the 29th, but although the front brought a very light and scattered rain in Southern Queensland as it passed east to the South and Central Coast, the main rain centre moved rapidly south to South-east through New South Wales and Victoria.

Temperatures.—Average maximum readings ranged from 0.79 deg. above at Rockhampton and 0.29 deg. at Palmerville to 2.8 deg. below at Boulia. Exceptionally cold night temperatures were general, ranging in many districts from approximately 4 to 7 deg. below normal—4.5 deg. Longreach, 7.9 deg. Palmerville, 8.4 deg. Georgetown, 6.5 deg. Boulia, and 7.5 deg. Mitchell.

Frosts.—Many general frosts were recorded—Herberton 7, Camooweal 4, Winton 3, Longreach 13 (7 consecutive), Boulia 14 (8 consecutive), Mitchell 24 (12 consecutive), and Stanthorpe 27 (24 consecutive).

Some low minimum temperatures, screen and terrestrial, included Stanthorpe 19/8 deg. (5th), Tambo 26/20 deg. (20th and 21st), 27/20 deg. (7th and 8th), Mitchell 23/14 deg. (23rd), and Winton 33/22 deg. (7th). Record low screen temperatures—Herberton 28 deg. on 27th, Georgetown equal record 32 deg. (21st).

Brisbane.—Pressure $\frac{9 + 3}{2}$ 30.027 (normal 30.077). Temperatures—mean maximum 69.4 deg. (normal 69.3 deg.); mean minimum 47.2 deg. (normal 51.8 deg.), lowest since record 45.7 deg. in 1908; mean temperature, 58.3 deg. (normal 51.8 deg.), lowest since 58.3 deg. in 1943, and 58.1 deg. in 1934. Highest daily 75.3 deg. (10th), lowest 39.9 (24th). Highest daily minimum 55.1 deg. (29th), lowest on record. Rain—22 points (average 261), lowest since 2 points in 1927. Number of days, one (average 8), lowest since nil in 1895. Sunshine—261.7 hours, highest on record (253.6 in 1923). Frosts (suburbs), 17 nights, highest on record (previous, 12 in 1943).

Snow reported at Wallangarra on 20th.

The rainfall position is summarised below—

Division.	Normal Mean.	Mean June, 1946.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	58	9	84 below
Peninsula South	45	Nil	100 ,,
Lower Carpentaria	51	Nil	100 ,,
Upper Carpentaria	83	1	99 ,,
North Coast, Barron	205	46	78 ,,
North Coast, Herbert	285	37	87 ,,
Central Coast, East	197	2	99 ,,
Central Coast, West	130	Nil	100 ,,
Central Highlands	159	2	99 ,,
Central Lowlands	117	5	96 ,,
Upper Western	67	1	99 ,,
Lower Western	73	Nil	100 ,,
South Coast, Port Curtis	251	7	97 ,,
South Coast, Moreton	297	13	96 ,,
Darling Downs, East	183	89	95 ,,
Darling Downs, West	159	88	95 ,,
Maranoa	158	6	96 ,,
Warrego	134	11	92 ,,
Far South-West	101	19	81 ,,

Commonwealth of Australia Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

AUGUST.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	6.30	5.18	Cairns	15	42	Longreach	29	40
6	6.27	5.21	Charleville.. ..	26	28	Quilpie	36	34
11	6.23	5.23	Cloncurry	41	58	Rockhampton ..	4	16
16	6.19	5.26	Cunnamulla ..	30	28	Roma	16	18
21	6.14	5.28	Dirranbandi ..	21	17	Townsville.. ..	15	35
26	6.10	5.31	Emerald	14	24	Winton	33	47
31	6.04	5.33	Hughenden ..	26	44	Warwick	4	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.

Date.	Rise.	Set.
	a.m.	p.m.
1	9.10	9.05
2	9.43	10.01
3	10.15	10.55
4	10·46	11.49
5	11.18	..
		a.m.
6	11.53	12.42
	p.m	
7	12.30	1.36
8	1.11	2.30
9	1.57	3.24
10	2.48	4.17
11	3.43	5.07
12	4.41	5.54
13	5.39	6.37
14	6.39	7.16
15	7.39	7.53
16	8.38	8.28
17	9.39	9.03
18	10.41	9 38
19	11.44	10.15
20	..	10.56,
	a.m.	
21	12.50	11.43
		p.m.
22	1.56	12.35
23	3.01	1.34
24	4.02	2.37
25	4.57	3.45
26	5.46	4.17
27	6.28	5.50
28	7.06	6.51
29	7.40	7.49
30	8.12	8.44
31	8.44	9.39

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS)

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	16	21	31	38	7	12	36	43
6	25	13	42	29	17	3	49	32
11	29	11	44	25	19	0	52	28
16	19	17	36	33	10	8	41	37
21	12	27	27	43	2	18	30	51
26	13	26	28	42	2	17	31	49
31	22	15	38	31	13	7	43	35

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	21	34	45	54	30	39	19	29
3	31	23	52	46	36	31	26	21
5	41	13	57	40	42	25	34	14
7	49	10	63	38	48	23	40	11
9	53	5	67	34	50	20	44	7
11	52	5	66	34	50	20	43	7
13	46	10	61	38	46	23	37	11
15	36	19	55	44	40	29	30	18
17	25	30	47	50	32	35	22	25
19	14	40	41	57	26	42	14	34
21	10	48	38	62	23	48	10	40
23	5	52	35	65	20	50	6	44
25	7	48	36	62	21	48	8	40
27	14	41	41	58	26	43	14	34
29	25	31	47	51	32	36	22	26
31	35	20	54	44	39	29	29	18

Phases of the Moon.—First Quarter, 5th August, 6.55 a.m.; Full Moon, 13th August, 8.26 a.m.; Last Quarter, 20th August, 11.17 a.m.; New Moon, 27th August, 7.07 a.m.

On 20th August the Sun will rise and set about 15 degrees north of true east and true west respectively, and on 2nd, 16th, and 30th August the Moon will rise and set almost true east and true west respectively.

Mercury.—At the beginning of the month will set a little after sunset, being at inferior conjunction on the 2nd, after which it will rise before sunrise. On the 20th it will reach greatest elongation west when it will rise over 1 hour before the Sun and at the end of the month it will rise about 50 minutes before the Sun.

Venus.—At the beginning of the month will set between 8.30 p.m. and 9.30 p.m., and on the 9th will pass less than 1 degree south of Mars. At the end of the month it will set between 9 p.m. and 10 p.m., and on the 31st it will be less than 1 degree north of Spica.

Mars.—Will be close to Venus during the month, being less than 1 degree away on the 9th, Venus by far being the brighter. At the beginning of the month Mars will set between 8.45 p.m. and 10 p.m., and at the end of the month between 8.15 p.m. and 9.30 p.m.

Jupiter.—Besides Venus and Mars Jupiter will also be in the constellation of Virgo, setting between 10.45 p.m. and 11.45 p.m. at the beginning of the month and between 9 p.m. and 10 p.m. at the end of the month.

Saturn.—At the beginning of the month will be still too close in line with the Sun for observation. At the end of the month it will be observable low in the east during morning sunlight, and may be confused with Mercury, which will be lower in altitude and farther south.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

JUNE RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of years' re-ccrds.	June, 1945.	June, 1946.		June.	No. of years' re-cords.	June, 1945.	June 1946
North Coast.	In.		In.	In.	*South Coast—cont'd.*	In.		In.	In.
Atherton	1·73	42	1·36	0·64	Gatton College ..	1·72	44	4·66	0·09
Cairns	2·89	61	2·15	0·74	Gayndah	1·82	72	1·08	0·02
Cardwell	2·09	71	1·32	0·39	Gympie	2·60	73	3·83	0·05
Cooktown	2·09	67	0·87	0·43	Kilkivan	2·14	62	1·73	Nil
Herberton	1·18	57	0·74	0·21	Maryborough ..	2·93	72	2·66	0·18
Ingham	2·49	51	3·52	0·09	Nambour	3·69	47	9·06	0·16
Innisfail	7·41	62	3·76	1·35	Nanango	1·95	61	2·57	0·06
Mossman	2·97	19	1·51	0·85	Rockhampton ..	2·51	72	1·78	Nil
Townsville	1·38	72	2·97	Nil	Woodford	2·78	55	5·26	0·0
Central Coast.					*Darling Downs.*				
Ayr	1·48	56	3·40	Nil	Dalby	1·63	73	2·58	Nil
Bowen	1·64	72	2·70	Nil	Emu Vale	1·45	47	6·70	Nil
Charters Towers ..	1·31	61	1·02	Nil	Jimbour	1·53	64	1·88	Nil
Mackay . .	2·74	72	4·24	0·07	Miles	1·69	58	1·51	0·02
Proserpine .. .	3·22	40	4·01	Nil	Stanthorpe	1·88	70	6·02	0·20
St. Lawrence ..	2·46	72	2·55	Nil	Toowoomba	2·33	71	5·95	0·06
South Coast.					Warwick	1·70	78	5·15	Nil
Biggenden	2·16	44	0·85	Nil	*Maranoa.*				
Bundaberg	2·79	60	1·00	Nil	Roma	1·49	69	2·47	0·02
Brisbane Bureau ..	2·61	94	5·90	0·22	St. George	1·49	62	1·47	0·17
Caboolture	2·74	67	4·44	0·17					
Childers	2·40	48	1·49	0·07	*Central Highlands.*				
Crohamhurst	4·29	50	6·56	0·23	Clermont	1·68	72	3·60	Nil
Esk	2·14	56	5·16	Nil	Springsure	1·76	74	4·52	Nil

CLIMATOLOGICAL DATA FOR JUNE.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure at Mean 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Coastal.									
Cairns	..	79	59	82	1	43	22, 23	74	5
Herberton	..	71	43	78	1, 10, 11	28	22	21	2
Townsville	..	77	52	84	1, 19	43	7	Nil	..
Rockhampton	30·11	75	44	83	10	35	23	Nil	..
Brisbane	30·08	69	47	75	10	40	24	22	1
Darling Downs.									
Dalby	..	66	34	77	10	21	8	Nil	..
Stanthorpe	..	58	28	71	12	19	5	20	5
Toowoomba	..	62	36	72	10	26	12	6	2
Mid-Interior.									
Georgetown	30·05	81	47	88	11	32	21	Nil	..
Longreach	30·17	73	42	85	10	34	21	Nil	..
Mitchell	30·17	66	32	77	10, 17	23	23	5	1
Western.									
Burketown	..	80	50	87	10, 12, 13	40	21	Nil	..
Boulia	30·11	71	42	81	10, 16, 17	32	22	5	1
Thargomindah	30·15	65	..	76	16, 17, 18	..	..	38	2

A. S. RICHARDS, Divisional Meteorologist

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

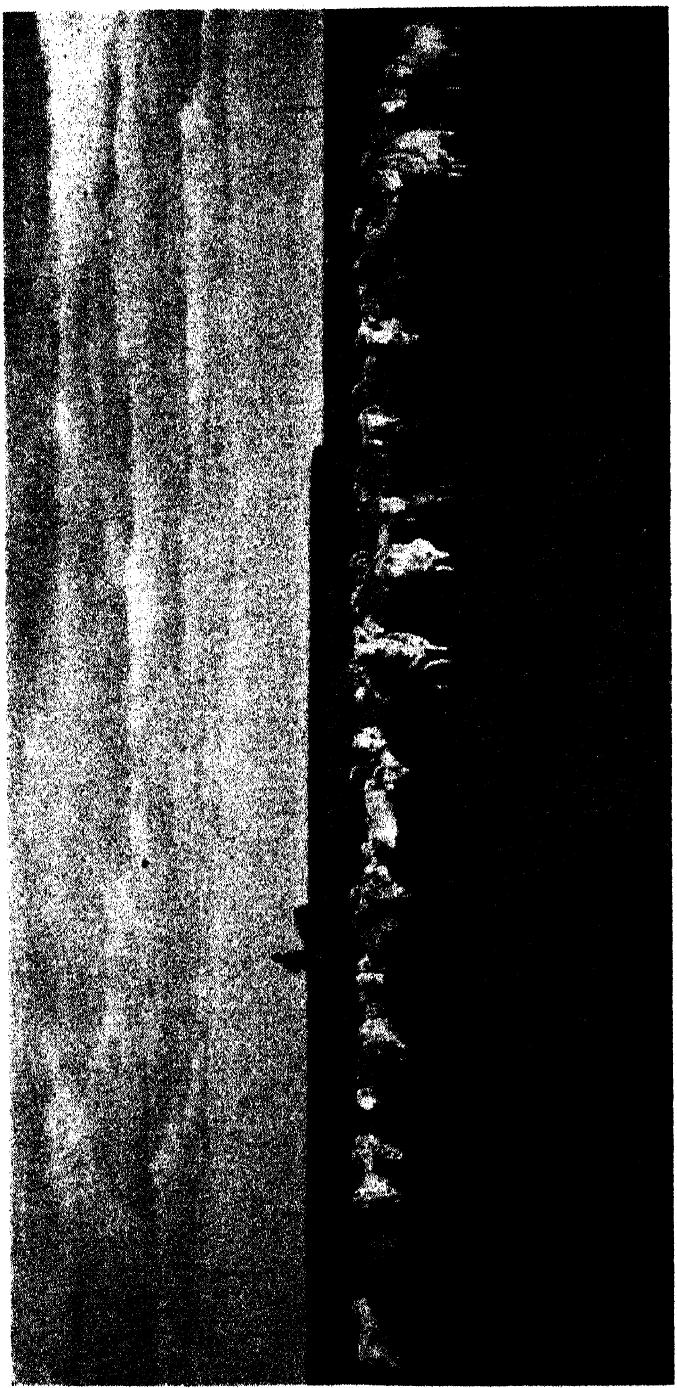


Plate 25.

EWES AND LAMBS ON LUCERNE, CONDAMINE PLAINS.

Volume 63 Part 2

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

AUGUST, 1946

Issued by Direction of
THE HONOURABLE H. H. COLLINS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

PAGE

Event and Comment—
A Call for More Cotton 67
The Demand for Good Meat 68

✓ Field Crops—
Fodder Crops in the Mackay District 69

✓ Fruit Culture—
Papaw Latex Production in Queensland 74

Plant Protection—
The Potato Tuber Moth and D.D.T. 81
The Spring Spray Programme in the Citrus Orchard 82
Control of the Banana Rust Thrips 83
D.D.T. and Codling Moth Control 86

Sheep and Wool—
Copper Deficiency of Sheep in Queensland 87

The Dairy Industry—
The Care of the Cream Separator 92
Feeding the Cow Before Calving 94
Hand Feeding of Dairy Cattle 95
How Butter is Made 97
Production Recording 100

The Pig Farm—
The Bacon Pig 103

PAGE

Registered Hatcheries 109

Animal Health—
The Buffalo Fly 112

The Late Dr. Eugen Hirschfeld 117

General Notes—
Shortage of Poultry Feeds 119
Relief for Dairy Farmers 119
A Long-term Livestock Policy 119

Rural Topics—
Record Price for a Beef Bull 120
Shell Educational Film Library 121

Gadgets and Wrinkles—
A Bag Lifter from Bush Timber 122
Keeping Yarn in the Eye of a Needle 122
Tallow Slows up Rope Wear 122

The Farm Home—
Before Baby is Born 123
In the Farm Kitchen 124

Queensland Weather in July 125

Astronomical Data for Queensland 126

Rainfall in the Agricultural Districts 128

Climatological Table for July 128

STATE'S SEEDS ARE GOVERNMENT TESTED

	Bushel s.	d
BEANS—Brown Beautys ..	70	0
BEANS—Canadian Wonders	82	6
BLUE LUPINS, N.Z. ..	13	6
DUN FIELD PEAS ..	15	0
SEED BARLEY	6	6
	lb	
PUMPKINS—Beaudesert ..	5	0
PUMPKINS—Cattle ..	2	6
RAPE—Dwarf Essex ..	1	1
RAPE—Giant Kangaroo ..	1	2

ASK FOR YOUR REQUIREMENTS

SEED POTATOES

Brownells, Factors, Carmens, and Certified Factors

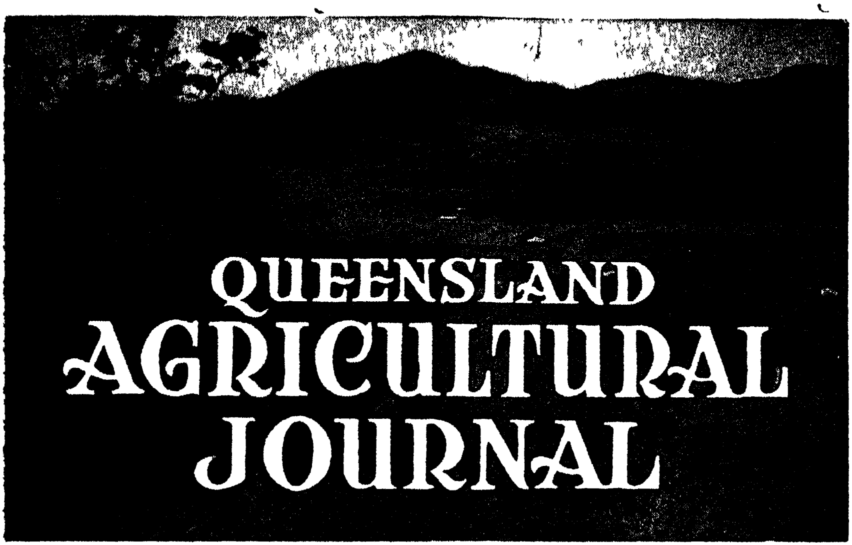
Delivery When Required

ORDER NOW

State Produce Agency Pty. Ltd.

ROMA STREET BRISBANE

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, including postage. General Public, **Ten Shillings**, including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Volume 63 1 AUGUST, 1946 Part 2

Event and Comment.

A Call for More Cotton.

COMMENTING on the passing of the *Cotton Bounty Bill* by the Federal Parliament, under which a minimum price of 15d. a lb for raw cotton is guaranteed for the next five years, the Minister for Agriculture and Stock (Hon. H. H. Collins) stated that there was apparently some misunderstanding as to what price the growers would obtain. The present guaranteed price for raw cotton, which is equivalent to 5¼d a lb. seed cotton, was, he said, the assured price to growers over the next five years. Growers might receive substantially better prices, in accordance with the sale values obtained by the Queensland Cotton Board for each season. It was announced by the Board recently that a basic price had been obtained for the 1946-47 season which, if a crop of over 6,000 bales of raw cotton were produced, would return to the growers approximately 6½d. a lb. of seed cotton.

The Minister pointed out that this price would be nearly a 1d. a lb. seed cotton better than had ever been paid to Queensland growers, and could possibly be improved if a substantially greater yield than 6,000 bales of raw fibre were produced in this State in the coming season. He felt that all farmers in the cotton-growing districts should, therefore, plant as much cotton as they could properly farm. There was a definite need for increased production of cotton not only to ensure that Australia's requirements for raw cotton will be met, but also to increase the supply of protein-rich concentrates for the dairying and pig raising industries in this State.

Continuing, Mr. Collins stated that it was most opportune that an improved price for cotton was being obtained. The productivity of thousands of acres of pastures had been seriously depleted during the past two dry seasons. The best way to restore the carrying capacity of these areas, where the land was suitable for cotton, would be to plough them out and plant cotton for two or three seasons, and then re-sow the pasture. The cultural operations associated with cotton-growing would help to restore favourable conditions for the re-establishment of pastures of good quality for three or four years, when the land could again be prepared for cotton-growing. He felt that dairy farmers should undoubtedly practise the grassland-cotton rotation more extensively than was the general custom. It was becoming recognised in all countries with highly developed systems of agriculture that the best results were obtained from pastures where grassland was included in the cropping rotations for short rather than for long periods. Many pastures on dairy farms in the cotton-growing districts of Queensland had been established for as long as twenty years, and were now undoubtedly at a very low ebb as regards both productivity and quality. While it was realised that the long dry period would make preparation of seed beds out of grassland difficult unless rain occurred in the near future, he hoped that all dairy farmers with soils suitable for cotton would make every effort as early as possible to get land prepared for as much cotton as could be properly farmed during the coming season.

Mr. Collins also stressed that there had been a big increase in the installation of irrigation plants for growing food crops during the war. Investigations by his Department had clearly demonstrated that growing cotton with supplementary irrigation greatly increased cotton yields, and he suggested, therefore, that with the improved prices for cotton farmers with the watering facilities and equipment should include cotton-growing under irrigation in their cropping programmes.

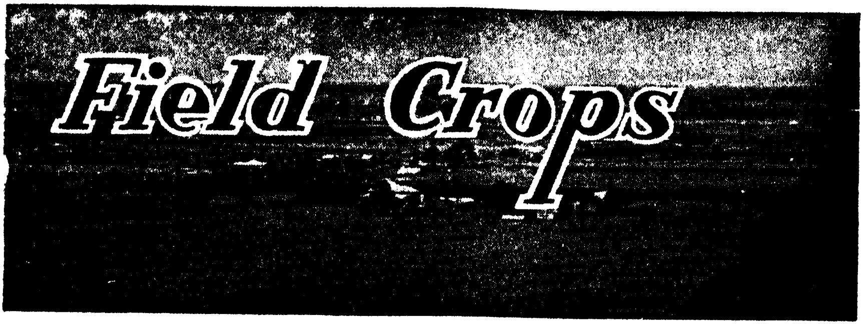
The Demand for Good Meat.

ADDRESSING members of the Aberdeen-Angus Society recently, Mr. Collins said that never was there a greater demand for good meat than at present. A survey recently completed by a competent authority—the Abattoir Royal Commission—showed that although Queensland had already nearly half the cattle in Australia, the number could be doubled by improving our cattle country and developing some particularly fine fattening lands along the Cooper.

Judging by the cattle to be seen at the Brisbane Show, Queensland could produce beef equal to the world's best. The point was that we should produce more of it. The day had gone when the five-year-old bullock could be looked on as prime beef. If consumers were demanding beef from eighteen-months-old and two-year-old steers, Australia must meet the market.

Crop fattening of beef cattle was being done on a limited scale, but would have to be practised more extensively together with water conservation to ensure better feeding and more regular pasture growth. Good seasons and bad were part of our natural conditions. The cattle industry would never come into its own while there was a continuance of hit-or-miss methods.

There was much talk of "tenderising" meat, added Mr. Collins. He thought the better way to supply the market for tender meat would be to produce young cattle of what was called the modern type. That would also give a bigger outturn of cattle from our grazing country. He looked forward to the time when crop fattening would become part of our ordinary cattle economy, when all rivers would be locked and the water used for irrigation; and also to the development of markets in the "Near East" as well as Britain.



Fodder Crops in the Mackay District.

N. E. GOODCHILD, Senior Adviser in Agriculture.

THE recently experienced dry winter season must have brought home to everyone associated with the stock raising industries in this State the urgent need for further attention to fodder crops and fodder conservation to supplement our natural and artificial pastures. The need for active attention to the growing of fodder crops and of fodder conservation is just as evident in the Mackay district as it is elsewhere in Queensland. The usual practice of most stock owners in the past has been to rely on native pasture grasses to a very large extent and, in some cases, also on sown permanent pastures.

A glance at butter factory reports and fat stock sales reports would be sufficient to indicate to any interested person the need for some modification of this past practice. Such records show very clearly that at certain times of the year production falls far short of production at other times of the year. This inevitably follows where stock owners depend entirely, or almost entirely, on pasturage.

There are two obvious ways in which the position can be improved. In the first place, stock owners can give more attention to the use of feed and of cultivated crops grown during that part of the season in which natural and sown pastures are not making prolific growth. In the Mackay district this season occurs in winter and early spring. It may not always be possible to grow winter fodder crops when the farmer is entirely dependent on natural rainfall, but in many seasons winter fodder crops can be grown quite successfully in this district. A glance at Plates 26 to 28 will give some indication of the bulk of fodder which can at times be grown during the winter months when growth in permanent pastures is at a low level.

The second way in which improvement can be effected in the fodder position is by fodder conservation. A great many different types of fodder crops are suitable for conservation, either as grain, as hay, or as silage. The possibility of growing grain crops satisfactorily in the Mackay district is not great, and therefore no further consideration is given to the production of grain crops in this article.

Winter Fodder Crops.

In a district such as this, where the winter temperatures are not particularly low, the one cereal most likely to give satisfactory results is oats. Other fodder crops such as barley, rye, canary seed, and field peas are not likely to be as useful as the former in this particular area.

When it is intended to plant oats for fodder in the Mackay area the land may be prepared towards the end of the wet season, say about March or April, by thorough ploughing and preparation of a good seed-bed, with a view to planting in late April or May. The seed may be drilled in with a seed drill, if one is available, or it may be broadcast and harrowed into the ground. If the former method of planting is adopted about 1 bushel to the acre should be sufficient, but slightly more seed would be required when the crop is broadcast and harrowed in. No cultivation is possible during the growing period of the crop; therefore, the need for thorough clean preparation of the seed bed is obvious. Provided a reasonable amount of rain is experienced during the growing period, a great volume of feed can be expected from a field of oats. Grazing should not be attempted before the root system is well developed and the plants are firmly established in the ground. This stage can normally be expected to have been reached about six to ten weeks after planting. In a season of adequate rainfall good grazing can be expected between June and September. If it is not desired to feed the crop off green, it may be allowed to develop to the seeding stage and then made into hay. The best method of haying oats is undoubtedly to cut with a reaper and binder, and cure the hay in the sheaf by stooking in the field. However, if no reaper and binder is available, hay can be prepared by mowing and curing loose, although when this method is adopted handling is much more difficult. Should the crop not be required for grazing, or for hay, oats will also make very satisfactory silage, if cut when the grain is at about the milky stage or even earlier. The crop may be ensiled after chaffing, or the green sheaves may be ensiled entire.

Plate 26.
MOWING CROP OF SUNRISE OATS, SARINA DISTRICT.

It may not always be possible to sow oats at the most desirable time; for example, suitable rains may not have occurred, or other farm operations may have delayed the preparation of the land. However, satisfactory results have at times been obtained when planting has been delayed even into July. During a wet winter the crop may be affected by rust. No practicable means of controlling this disease is available, and if rust should occur the farmer would be well advised to make the most of what feed is available before the crop is rendered useless.

Summer Fodder Crops.

As a rule, pastures are at their most succulent and useful stage during the summer months. However, it may be considered desirable to grow supplementary fodder crops even during this period of the year. Crops such as white panicum and Sudan grass, if planted in the spring, should, provided reasonable weather is experienced, produce a great deal more feed for stock than the usual type of pasture. Again, it is necessary to provide a well-worked seed-bed before attempting to plant summer fodder crops. The time of planting will be dependent on the occurrence of suitable planting rains, but these may be expected any time from September onwards. The period of heavy rainfall between January and March is not conducive to the satisfactory establishment of fodder crops, and for this reason it is desirable to plant before the wet season sets in. Once such crops are well established, growth is not seriously retarded by the heavy wet season rains. However, it is considered that the most profitable use to which summer crops can be put in this district is fodder conservation.

Plate 27.

Harvesting Sunrise Oats at Sarina

Fodder Conservation.

Whilst the conservation of fodder in the form of hay may have some place in the economy of this district, undoubtedly conservation of fodder as silage will play a more important part. A considerable number of the farmers and graziers in the area are already becoming interested in silage as a form of fodder conservation. This is readily understandable, as the urgent necessity for some form of fodder conservation to combat periods of dry weather must be as apparent to any progressive stock owner in this district as elsewhere in the State.

Silage.

A great advantage of silage is that it provides a succulent and bulky feed at a time when feed is not only short but also dry, and apart from the actual food value in the material its succulence has also a very real value. Usually, the more bulky crops are used for silage, because they provide a heavy yield per acre, and naturally this lowers the cost of production. For instance, it would be expected that it would cost less per ton to grow 200 tons of green maize on 20 acres than it would cost to produce 200 tons of oats on 40 acres; in one case the area being twice as great as in the other case. Very good silage can be made from green maize or from saccharine sorghums, and both of these crops can be expected to produce very heavy yields per acre. However, as stated earlier, green oats will make good silage, and in fact, any bulky succulent greenfeed can be cured into good silage. If the bulky feed is high in carbohydrates, such as is the case in maize, sorghums, and other grasses, silage can be made without the addition of any other materials. If, however, the succulent crop carries a high percentage of protein, such as occurs in lucerne or cowpeas, it is necessary to add, when making silage, some supplementary material which will facilitate the curing of good silage. The most satisfactory material to add to either lucerne or cowpeas for making silage is a high carbohydrate fodder, such as maize, saccharine sorghum, or even cane tops, but if none of these is available a satisfactory silage can be produced by adding a mixture of 50-50 molasses and water to the extent of about 6 per cent. by weight.

Silos.

This term usually conjures up an image of an aboveground "tub" silo, but several other types of silos, cheaper than the tub silo, can be used.

(*a*) *The Overhead Silo.*—This cylindrical building is usually constructed of reinforced concrete, the walls being about 4 inches through. The diameter and height vary according to the capacity required.

(*b*) *The Pit or Circular Underground Silo.*—This comprises a circular pit, preferably with a concrete collar down to a depth of about 4 feet, where the lower soil has good holding properties.

(*c*) *The Trench Silo.*—This excavation is long and narrow, and is constructed very cheaply with modern machinery, but may not be used very often, and can only be used where the soil and drainage conditions are favourable.

(*d*) *The Open Stack Silo.*—This is actually not a silo in the real sense of the term, but is merely a stack of silage material built something like a hay stack, but confined between a pallisade of strong high poles at intervals of about 2 feet and covered by a considerable weight of earth.

The Silage Crop.

When it is considered necessary to grow a crop especially for silage, the best results can be expected from a crop comprising a mixture of a grassy crop and a legume, for example, maize and cowpeas. However, maize or saccharine sorghum can be planted in drills with cowpea seed, and provided favourable weather is experienced and the soil is suitable and fertile, huge crops of excellent silage material may be obtained from these mixtures; for example, with maize and cowpeas a bulk of 10 to 12 tons per acre is not an unreasonable expectation. Both crops are planted in the normal way, preferably with a maize drill or, if this is not available, they can be dibbled into a shallow drill made with a light swing plough. The maize would be planted at around 12 to 16 lb per acre, and the cowpeas at a rate that will provide about four seeds to every foot of row. Instead of maize, a saccharine sorghum may be substituted at the rate of approximately 6 to 8 lb per acre The drills should be sufficiently far apart to facilitate normal inter-row cultivation

Plate 28.
SUNRISE OATS GROWN ON ALLUVIAL FLAT AT PLANE CREEK.

It is not possible in a short article such as this to cover such an extensive subject as fully as may be desirable. However, if enough has been said to indicate, particularly to interested farmers, the lines along which they may direct their farm operations and farm management in order to cope with the possibilities occasioned by prolonged periods of dry weather, its object will be achieved. All interested stockowners are strongly recommended to consult the local Advisory Officer of the Department of Agriculture and Stock with respect to further details concerning their own particular problems, for example, the work associated with the erection of a silo, growing of the necessary crop to fill that silo, and the harvesting and acreage of such a crop. Not one to be undertaken lightly, it must be apparent to all progressive men that, if periods of alternating high production and low production are to be merged into uniformly high production throughout the year, it is a task which must eventually be undertaken by all.

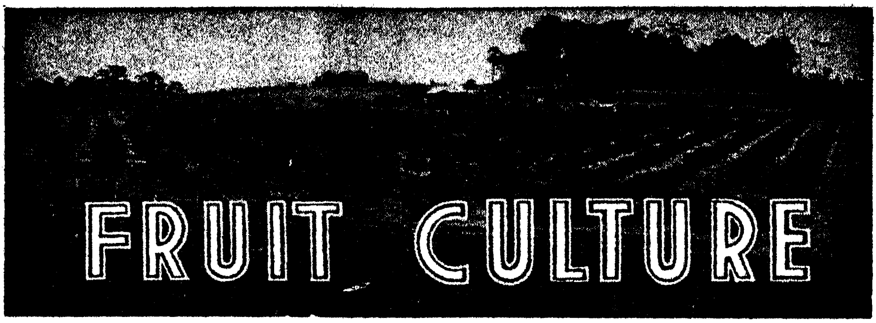
THE COUNTRYMAN'S SESSION

Sunday Morning Radio Service to Farmers

(By arrangement with the Australian Broadcasting Commission)

Farmers are recommended to tune in to either a Queensland National or Regional Station.

EVERY SUNDAY AT 9.5 a.m.



Papaw Latex Production in Queensland.

G. W. J. AGNEW, Horticulture Branch.

IT has been shown that the active principle or enzyme contained in the milky latex of the green papaw can be used to advantage in several commercial operations connected with fellmongering of sheep skins, preshrinking of wool, and clarification of certain brewed beverages. During the war, the demand for "papain," the name given to the powdered or dried latex, increased considerably, and consequently a certain amount of investigational work on this product has been undertaken.

Some work was done in 1942 on the collection and preparation of papaw latex. This work was carried out in collaboration with the Industrial Chemistry Division of the Commonwealth Council for Scientific and Industrial Research. Various samples of latex were obtained from papaw trees growing in the Maroochy area. Latex was extracted from immature fruits, and from the pressed juices of leaves, leaf stalks, and growing tips. Samples were taken from three distinct varieties, viz., Hawaiian Solo, Nambour No. 1, and New Guinea Red. In preliminary tests, fresh latex was treated with either alcohol or acetone, but later samples were air dried on glass before being despatched by air to Melbourne, where determinations were made of enzyme activity.

W. J. Ellis and F. G. Lennox in a paper entitled "Some Observations on Australian Grown Papain," which appeared in the Journal of the Council for Scientific and Industrial Research for August, 1943, reported that:—

(1) "Papain samples prepared by drying latex from green fruit grown in Queensland possessed marked gelatinase and rennase activity."

(2) "Juice pressed from the skin of the fruit possesses higher rennase activity than that obtained from the fruit flesh."

(3) "Seed extract has no measurable activity."

(4) "The activity of the latex is of the same order for papain from different species (varieties) and for preparations dried in alcohol, acetone, or in air."

Notes on Latex Collection.

Method of Tapping Fruits: Much of our very limited experience in tapping of papaw fruits for the collection of latex is comparable with that reported by Hawaiian workers. The procedure is as follows:—About three full-length incisions one-eighth inch deep are made on the surface of green fruits (Plates 29 and 30) with a stainless steel knife. The latex flows almost instantaneously, and streams into a glass receptacle. The first flow runs freely for about 8-10 seconds, then diminishes rapidly, and drips on slowly for another 25-30 seconds. Finally the latex oozing from the cut surface congeals on the surface and is scraped off and collected. The tedium and the slow rate of collection involved in holding a receptacle under each tapped fruit long enough to obtain the maximum amount of latex are factors which have caused this work in overseas countries to pass into the hands of cheap coloured labour.

Plate 29.

ILLUSTRATING THE METHOD EMPLOYED IN COLLECTING PAPAW LATEX.

Difficulties Encountered in Tapping: It is possible with loose free-hanging fruit, as shown in Plate 31, to continue making incisions whilst the receptacle is being held to collect the latex from the first incision. Unfortunately, this type of fruit is not often encountered, as most trees have fruits crowded together and set at an angle to the stem, thus preventing the making of full-length cuts, with consequent reduction of the amount of latex collected. Instead of streaming to the apex of the fruit, the latex runs off at the sides, necessitating the use of a large and cumbersome collecting dish.

Time of Tapping: Best results are obtained by tapping fruit during the wet summer months of January, February and March, and especially following rain. Latex flow also appears to be greatest early in the morning.

Suitability of Varieties for Tapping: Obviously, dwarf growing trees which produce their first fruits within 2-3 feet from ground level, as do many of the strains carrying the Betty character, are more suitable for latex collection than tall-growing varieties, such as the Hawaiian Solo and many local ones.

Varieties which bear medium-sized fruits, which hang freely, are the most desirable. The feature of free-hanging fruits is one which, besides being dependent on varietal type, is also considerably affected by closeness of planting, and by the extent of effective pollination of all fruits on the tree.

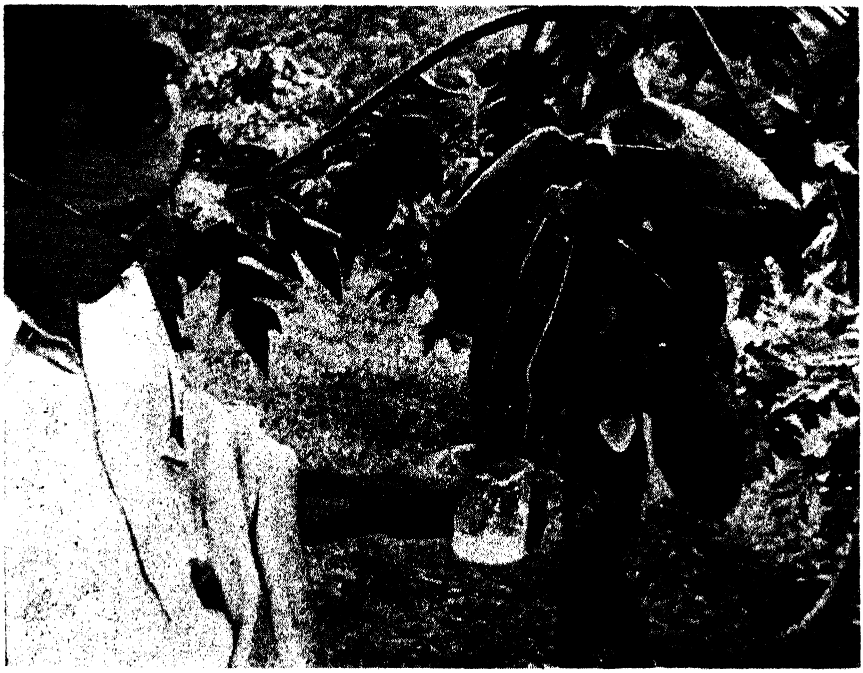


Plate 30.

ILLUSTRATING THE METHOD EMPLOYED IN COLLECTING PAPAW LATEX FROM THREE FULL-LENGTH INCISIONS ON THE SURFACE OF A PENDANT FRUIT.

No extensive tests have been conducted with regard to quality of papain produced by different varieties, but tests with three varieties grown at Nambour, carried out by officers of the Council for Scientific and Industrial Research, have shown that there is a consistent difference in enzyme activity in favour of the New Guinea variety.

Latex Yields: An average half-grown fruit of 2 lb. weight produces about 2 cubic centimetres of fresh latex (there are about 29 cubic centimetres in a fluid ounce). No accurate information as to yields is available, though reports by some collectors state that they count upon obtaining a yearly production of 1 lb. of dried latex per tree.

Some authorities state that the coagulated latex will produce about one-quarter of its weight as air-dried powder. For Queensland fruits the yield of dried papain varied between one-fifth and one-eighth of the weight of fresh latex.

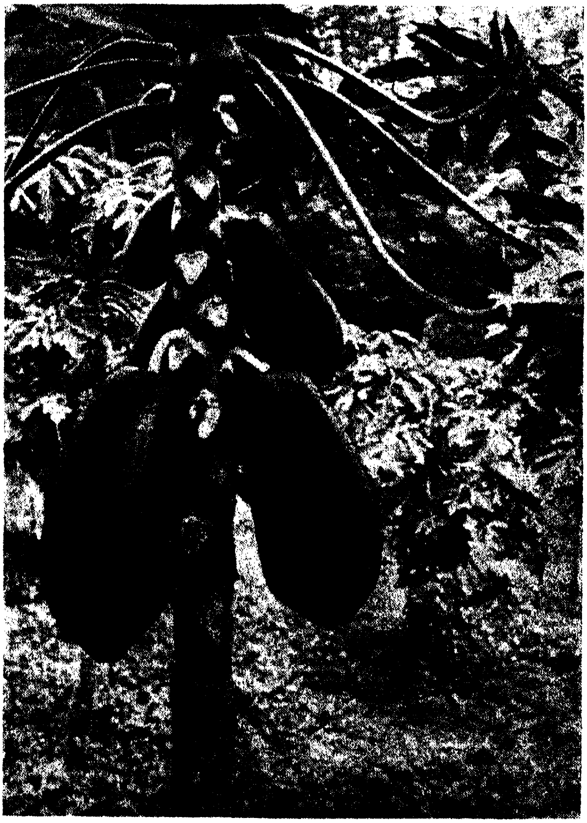


Plate 31.

FRUIT TYPE CONSIDERED TO BE IDEAL FOR LANCING FOR THE COLLECTION OF PAPAW LATEX.

It has been found by some collectors that the first exudation of latex gives the greatest yield and the best quality of papain, and it has been recorded that potash starvation disastrously affects the yield of papain, but that phosphate starvation does not exert any marked effect.

Possibilities with Male Trees: It is considered that the fruits produced by some male trees could be utilised to advantage in the production of papain. Within some strains (see Plate 33), notably those carrying Betty characters, there is a large percentage of male trees which bear as many of 100 or more fruits. These fruits are normally wasted, whereas their skins could be used to produce papain.

Latex from Pressed Plant Juices: It was previously thought that young trees quickly grown during the summer would be of sufficient size (as in Plate 34) in from 4-5 months to be crushed prior to separating the papain from the pressed plant juices. It is not expected that the yield of papain would be large, and no actual figures are available to indicate whether it contains a working quantity of papain.

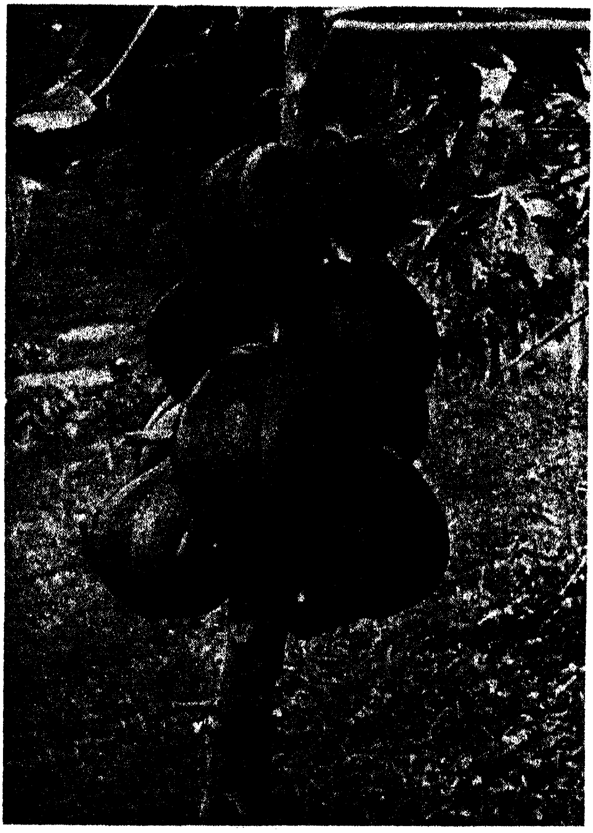


Plate 32.

SHOWING THE SCARS ON PAPAW FRUIT RESULTING FROM LANCING FOR LATEX COLLECTION EIGHT MONTHS PREVIOUSLY.

Following the investigations mentioned above, officers of C.S.I.R. reported that they were unable to detect enzyme activity in the pressed plant juices prepared at Nambour and treated with acetone. In this instance, however, it was considered that enzyme deterioration had occurred due to the effects of acetone.

W. W. Jones, working in Hawaii, considers that the papain can be separated from the pressed plant juices of stems and leaves by the addition of ammonium sulphate or alcohol, and that because the product is about equal in enzyme activity to the dried latex from fruits it offers possibilities for the machine preparation of papain.

Commercial Production Possibilities.

The matter of greatest immediate concern is whether it would pay the fruitgrower to collect and dry the latex at the ruling market price of 20s. per lb. for the dried product.

Local Experience in Harvesting: It has been shown that an operator with little or no previous experience can harvest latex from about 30 fruits per hour, using trees in their first crop and with most fruits within easy reach of the ground (as illustrated in Plates 29 and 30). This represents a harvest of about 60-80 cubic centimetres of latex per hour. Taking three hours in the morning, 7 a.m. to 10 a.m., as being sufficient to produce the best results, it is therefore possible to harvest slightly more than ½ lb. of fresh latex in that time. After drying, about 1¼ oz. remains as the net yield, which at present is valued at 2s.

Plate 33.

A MALE PAPAW TREE BEARING ABOUT 50 PENDANT FRUITS WHICH NORMALLY GO TO WASTE. SOME STRAINS BEAR EVEN HEAVIER CROPS.

Plate 34.
YOUNG PAPAW TREES FOUR MONTHS OLD AND SPACED 3 FEET APART. SUCH TREES COULD BE CRUSHED TO PRODUCE LATEX.

Latex Collection as an Adjunct to Canning: Fruits which have been used for collecting latex are not necessarily lost thereafter. Plate 32 depicts the scarring which results from one series of incisions. The disfigurement resulting from a large number of incisions can well be imagined, and is such as to produce an unsightly appearance on the fruit, which would condemn it for the fresh fruit trade, though it does not impair its internal quality. Such fruits would be suitable for canning, provided the scarring did not produce deep furrowing. These fruits could then be profitably used in a young industry, which demands greater quantities of better quality fruit than it is receiving, as it is chiefly reject fruits that find their way to the canneries. Canneries have been payng £10 10s. per ton for canning papaws.

Further Investigation: With greater skill and experience, and with other conditions of fruit shape and position of fruit on trees being favourable, it seems very probable that the rate of latex collection will be improved. The chief line for further investigation on this subject is therefore considered to be the acceleration of the rate of latex collection so that the returns may be sufficiently attractive for papaw growers to consider tapping the fruits.

TO SUBSCRIBERS.

Please renew your subscription without delay. Write your full name plainly, preferably in block letters.

Address your subscription to the Under Secretary, Department of Agriculture and Stock, Brisbane.

PLANT PROTECTION

The Potato Tuber Moth and D.D.T.

N. E. H. CALDWELL, Entomologist.

FEW potato growers have escaped serious loss, at some time, from the activities of the potato tuber moth.* In southern Queensland the spring crop is the one which normally suffers from the attentions of this pest. In 1944 and 1945 losses were even more extensive than usual, and growers are, therefore, naturally concerned about the prospects for the spring planting this year.

Type of Injury.

The larva or "grub," the actively destructive stage of the insect, attacks all parts of the plant. Infestation of the leaves and stems may result in a reduction in yield, especially in non-irrigated crops during a dry spell, but, generally, tuber infestation causes the grower most concern. Many potatoes may have to be discarded in the field, while further deterioration may occur after harvesting if the tubers are not treated with a protective dust such as derris or magnesite.

Cultural Control Measures.

In the past, control of this pest in the field has depended on cultural measures—"hilling-up" and watering, where irrigation is available—and prompt handling at harvesting. Experience has shown that these measures have definite limitations in preventing tuber infestation, while it has yet to be proved that they have any appreciable effect on the "grub" population in the leaves and stems.

Possibility of Chemical Control.

Chemical methods of controlling tuber moth in the field—that is, the use of sprays and dusts—have hitherto not been successful. However, the appearance of the new insecticide, D.D.T., has again drawn attention to the possibility of this means of combating the pest, and many growers are considering the advisability of using this material on the spring crop of potatoes.

It has been amply demonstrated that D.D.T. will give a very good kill of tuber moth larvae in the leaves and stems of potatoes as well as of other susceptible plants, such as tobacco and egg plant. It has, however, not been so easy to show that a correspondingly satisfactory decrease in tuber infestation can be brought about for a reasonable expenditure on insecticide applications.

Experiments indicate that, for the best results, D.D.T. applications should start at the main flowering period, and that a later start of operations is attended by too much risk of quite unsatisfactory control.

---

* *Gnorimoschema operculella* Gn.

If the moth infestation turns out to be light, the value of the crop saved may scarcely cover the cost of treatment. On the other hand, should a severe attack develop, the money spent has reasonable prospects of returning a good profit.

The grower's best policy, therefore, is to regard insecticide applications as a form of crop insurance and to apply D.D.T. according to the provisional recommendations given below, if, in the light of past experience and of observations in the growing crop, a severe moth attack seems likely.

Provisional Recommendations for Use of D.D.T.

The best advice that can be tendered to growers at the present moment is to apply a D.D.T. spray at fortnightly intervals from the main flowering period onwards. This will mean at least three and perhaps four or five applications. A spray will give better results than a dust, and should contain 0·1 per cent. D.D.T. Proprietary brands of D.D.T. spray concentrates at present on the market give directions on the container for mixing the spray with water to give this strength. The rate of application will probably range from 60 to 100 gallons per acre and the spray is best applied by means of the power outfits now available for this purpose.

Attention should, of course, still be given to those cultural measures which assist in keeping an unbroken cover of soil over the tubers, while every precaution should also be taken as usual to prevent infestation of the tubers after they are dug. In other words, the application of D.D.T. must be regarded as one of a series of operations, each of which plays a part in reducing tuber moth damage in the field.

The Spring Spray Programme in the Citrus Orchard.

F. W. BLACKFORD, Pathologist.

THE citrus orchardist should have finished the winter application of a lime sulphur (1-15) spray by the end of August. Then, as the trees commence to bud and blossom, he should prepare for the spring copper spray. Home-made cuprous oxide mixture applied when most of the fruit has set—that is, when one-half to three-quarters of the petals have fallen from the blossom—is the all important spray for the control of most diseases disfiguring the fruit in the later part of the season. To be ready for use, the stock mixture or concentrate must be made up a little time beforehand, as it has to age in the barrel for at least a fortnight, preferably longer, before it is in the form which has been found to be the most effective. Accordingly, with the first appearance of flowers the concentrate should be prepared so that it will be ready for use at the correct time. The strength of spray to use is 3 gallons of the stock solution to 40 gallons of water.

The time of application is most important. In the first instance, it must be realised that copper sprays are preventive and not curative and to be of any value must be applied before diseases appear. The organisms causing black spot and brown spot are known to be capable of infecting the fruit over a considerable portion of its life on the tree. In the case of melanose and scab the state of affairs is somewhat different. The fungi causing these two diseases cannot infect the rind of the fruit once it has reached an age of approximately eight weeks; but the fruit from the time it is set until it reaches this age is susceptible to attack. Accordingly, in both cases, but particularly for melanose and scab, it is necessary to apply the spray as soon as most of the fruit has set, hence the recommendation—when one-half to three-quarters of the petals have fallen from the blossom. This ensures that nearly all of the fruit will receive a spray coating and the set is not harmed in any way. Delaying the application will permit infection, which cannot be eliminated by any subsequent treatment.

As a general rule, this application of copper should be made to all varieties. Coastal growers could well afford to do this. In the inland districts, such as Gayndah, there is not the same need for its use on navels or grapefruit, which are reasonably free from the skin blemishes due to the various diseases, but most other varieties will benefit from the copper spray.

With the spring application there may also be included in the spray mixture the zinc sulphate–lime or zinc sulphate–caustic soda spray for mottle leaf, lead arsenate for the grasshoppers which disfigure the rind of the fruit, and nicotine sulphate for aphids which sometimes are serious on the young growth. When preparing a combination spray mixture the most convenient method is to dissolve the zinc sulphate in a half kerosene tin of water and add it to the spray vat which has been half filled with water. The lime is mixed or caustic soda dissolved in another kerosene tin of water and slowly added while the vat is being filled, stirring well all the time. Just before the vat is completely filled the lead arsenate and nicotine sulphate mixed separately with a little water may be added and well stirred in. Finally the required amount of the stock solution of home-made cuprous oxide is poured in, the vat filled and the mixture well agitated.

When spraying it is essential that all parts of the young fruit, both sides of the leaves and the young twigs receive their coating of the spray mixture. Making sure of this takes time and material. However, the result justifies the effort, and picking and packing a heavier crop of clean fruit will pay dividends for the trouble taken earlier in the season.

Control of the Banana Rust Thrips.

N. E. H. CALDWELL, Entomologist.

THE banana rust thrips*, after a period of comparative inactivity, has again become prominent in southern Queensland banana growing districts. It is possible, therefore, that another series of bad "rust" years may be experienced in the immediate future. With the post-war market likely to become increasingly critical of blemished fruit, growers must once again face the question of controlling this pest. Since earlier investigations were made into this problem, some changes have taken place both in the banana-growing industry and in the sphere of pest control. On the one hand, rust control has undoubtedly been complicated by the increasing popularity of the Mons Marie banana, a fairly tall-growing type with bunches considerably less accessible than those of the Cavendish variety. On the other hand, the advent of the new insecticide, D.D.T., may do something towards simplifying the problem.

---

* *Scirtothrips signipennis* Bagn.

Established Control Measures.

Covering the bunch as soon as possible after it is thrown with a suitable hessian cover, bag, tube or cloak, and then dusting with a nicotine dust at regular intervals will give a very high degree of rust control. The cover must be a good quality "sugar" hessian, namely, 11 oz. hessian. More open types cannot be recommended. The nicotine dust should contain not less than 2 per cent. nicotine. The bunch should be dusted thoroughly either just before or just after the cover is placed in position. Subsequent dustings may be made in accordance with two schedules—either at fortnightly intervals until the bunch is harvested, or at weekly intervals for a period of three weeks, after which dusting is discontinued.

Brown paper bunch covers have at times been substituted for hessian with fair success. Single tubes of unglazed brown paper of a D/C rating* of not less than 30 lb., but preferably of 35 lb., will last the life of a bunch in many cases. Lighter papers are unlikely to prove satisfactory. During the wet season, when heavy rain may be accompanied by cyclonic winds, double tubes are advisable, particularly in exposed plantations.

The incidental benefits resulting from covering the bunches are considerable and well known to growers. They are, however, offset to some extent by certain practical difficulties. If bags are used, the "bell" must be broken off, either when the bag is placed on the bunch or a week or two later; otherwise rotting of the "bell" in the bottom of the bag may set up various fruit rots. Some method of marking the covers has to be adopted to indicate when a bunch requires dusting and also, in the case of bags, its approximate age. Cutting operations are slowed down to some extent when the bunches are covered. Finally, fixing covers to bunches of tall-growing varieties is probably impracticable in some cases.

Weekly applications of a nicotine dust throughout the life of the bunch will give fair control of rust, provided the treatment is thoroughly carried out. This method may find an application under some circumstances; for instance, in tall varieties on which bunch covering cannot be carried out.

Suggested Use of D.D.T.

Many growers will be interested in the prospects of using the new insecticide, D.D.T., for banana rust thrips control and some, no doubt, are determined to test this material on their own plantations.

A preliminary experiment was carried out last summer with a dust containing 2 per cent. D.D.T. The insecticide showed distinct promise. While the immediate reduction in thrips population was not as spectacular as in the case of nicotine, the greater persistency of D.D.T. appeared to have an important ultimate effect in reducing rust development. There are indications that on uncovered bunches the interval between treatments may be prolonged to at least a fortnight.

Dusts containing both nicotine and D.D.T. are expected to appear on the market shortly. Provided each ingredient retains its full effectiveness in the mixture, such dusts should play a very useful part in the rust control programme, combining the quick but short-lived action of nicotine, to deal promptly with the existing thrips population, with the

* The D/C rating is a trade designation based on the weight of a ream of sheets each 20 inches by 30 inches.

slower but more persistent effect of D.D.T., to delay the establishment of further colonies. This composite dust may prove especially useful for dusting, without covering, the comparatively inaccessible bunches of the taller varieties.

Growers wishing to try D.D.T. may, therefore, have the choice of a "straight" 2 per cent. D.D.T. dust and a nicotine-D.D.T. dust, containing adequate amounts of each active ingredient. The dusts can be used either on covered or uncovered bunches and the interval between treatments need not be less than a fortnight. It may be found that, on covered bunches, very few applications will be necessary, particularly with the mixed dust.

Precautions Necessary in Using D.D.T.

D.D.T. dusts are not expected to have any adverse effect on the banana fruit, but experimental work has not yet been sufficiently extensive for a complete assurance to be given on this point. Growers should watch the fruit closely, so that if any ill effects do occur they can be detected in the early stages and control measures changed.

In certain combinations D.D.T. loses some of its efficiency. It is believed that, in the dust form, any nicotine-D.D.T. mixtures marketed in Queensland will be quite satisfactory, but evidence from field experiments to confirm this point is not yet available. Provided "straight" dusts of suitable concentrations are procurable, growers can mix their own nicotine-D.D.T. dust as required, to guard against any deterioration in storage. Thus to obtain a dust with 2 per cent. of each toxic ingredient it would be necessary to mix equal parts of two dusts, one containing 4 per cent. nicotine, the other 4 per cent. of D.D.T.

Sprays containing D.D.T. should not, at present, be used for the control of the banana rust thrips, owing to the risk of injury to the fruit.

Important Points in Rust Control.

Control measures for the banana rust thrips may be necessary from October to April, but in many seasons the period is much shorter. The appearance of the young bunches in the plantation, and not of the cut fruit in the shed, is the key to the correct timing of control measures. When bunches less than a month old show appreciable amounts of thrips injury control measures should be put into operation. By the time rusty fruit is being cut, much of the damage for that season has been done.

It cannot be emphasised too strongly that, no matter what method of rust control is adopted, each bunch must be treated as soon as practicable after it is thrown, as the primary infestation takes place when the bunch is coming out of the plant throat. Thus regular inspections of the plantation, preferably every week, are necessary. Care should be taken at all times to ensure that the dust penetrates well into the top hands, where the greatest amount of rust almost invariably occurs, while at the first treatment the bunch stalk between the top hand and the plant throat should also be dusted.

The incidental benefits to the fruit resulting from covering the bunches are so great, particularly when it hangs through the winter, that the covering plus dusting technique is strongly recommended wherever it is practicable.

D.D.T. and Codling Moth Control.

N. E. H. CALDWELL, Entomologist.

CODLING moth is a major pest in the Granite Belt, and growers, particularly those with apples, the main crop attacked, are keenly interested in the possibility of using the new insecticide, D.D.T., to assist them in controlling this insect.

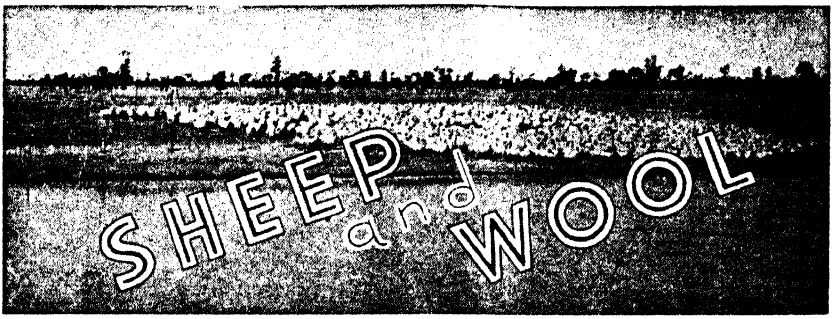
Experimental work, both in Queensland and elsewhere, indicates that, following a calyx spray of lead arsenate, cover sprays containing 0·1 per cent. D.D.T. will control codling moth on apples at least as well as, if not better than, insecticides such as lead arsenate, white oil, and white oil-nicotine sulphate. However, certain undesirable effects have followed the use of D.D.T. in experimental work at Stanthorpe. Populations of woolly aphids and mites increased rapidly on all trees receiving D.D.T. cover sprays and towards the end of the season they had reached serious proportions. This has also occurred in other parts of the world where D.D.T. is under trial. Presumably D.D.T. reduces the efficiency of the various parasites and predators which normally keep these pests in check. Growers intending to try this insecticide should, therefore, be prepared for a sharp increase in woolly aphids and mites, for which subsidiary control measures will probably be necessary. This effect is likely to be worst on late maturing varieties, which usually receive a greater number of cover sprays.

To offset these disadvantages, there is evidence that D.D.T. will have some beneficial effect in assisting to control fruit fly. Also, judging from experience with closely-related species on other crops, it is expected to give good control of the apple leaf-hopper. The effect on scale insects attacking deciduous fruits is unknown.

The strength of the spray should be such as to contain 0·1 per cent. D.D.T. Directions for mixing the materials available on the market to this concentration will be found on the containers. The use of higher concentrations is, in the light of present knowledge, unwise, because of the risk of injury to the trees and of the probable accumulation of undesirably heavy residues on the fruit. On the other hand, experiments suggest that lower concentrations will give less satisfactory control of codling moth.

If used at all, D.D.T. sprays should be applied in accordance with the timing schedules drawn up for the older-established cover sprays. While it has been shown that D.D.T. residues will kill both adult moths and young larvae, this effect is unlikely to persist in the field for more than about a fortnight. Thus the possibility of reducing the number of cover sprays with safety seems remote, even if D.D.T. were used throughout the season. However, because of the risk of increased woolly aphid and mite populations, it is perhaps unwise to contemplate using D.D.T. to this extent at present. It may be preferable to apply alternate sprays of D.D.T. and the insecticide formerly used on the orchard, with the additional safeguard that the D.D.T. treatment should be discontinued if the aphids and mites get out of hand.

Before embarking on a large scale programme involving D.D.T., growers should pay careful attention to the question of costs. D.D.T. sprays are more expensive than the alternative cover sprays and their use is not likely to reduce the cost of control measures for codling moth. Finally, should woolly aphids and/or mites get out of hand, additional expenditure may be incurred in controlling them.



Copper Deficiency of Sheep in Queensland.

G. R. MOULE, Veterinary Officer, Sheep and Wool Branch.

IN August, 1945, an inspection was made of the wool which was being shorn from some sheep depastured in north-western Queensland and it was considered this clip showed a fault characteristic of copper deficiency. Subsequent research work carried out conjointly by C.S.I.R. and this Department confirmed this suspicion and revealed that there were some large, fairly well defined areas where a copper deficiency occurs. The purpose of this article is to acquaint graziers with the symptoms and correction of the trouble.

The Utilisation of Copper by Plants and Animals.

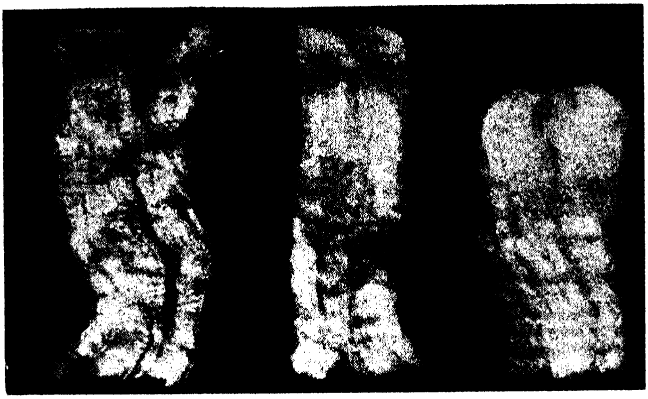
Copper occurs in the soil and during their growth plants take up minute quantities. Various factors influence the amount of copper in the plants. Of these the amount of copper present in the soil, presence of other elements, plant species and stage of growth, are amongst the most important.

When the plants are eaten some of the copper is absorbed into the bloodstream during the normal process of digestion, and it is later stored in the liver. Although the amount of copper required is extremely small, it has a vital function to perform in the formation of red blood cells, and apparently in determining the arrangement of the protein molecules which make up the wool fibres. When there is insufficient copper in the plants to keep abreast of the rate at which the copper is utilised by the animals, supplies are drawn from the liver stores. When these are exhausted symptoms of copper deficiency become obvious.

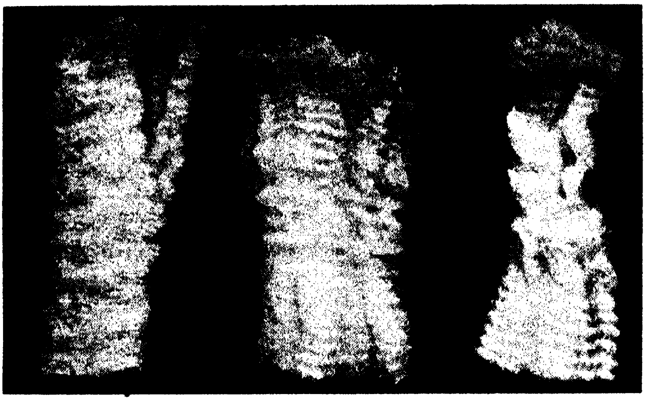
Symptoms of Copper Deficiency in Sheep.

The symptoms produced by copper deficiency depend upon the age of the animal. In adult sheep the most noticeable lesion is in the wool and the changes which occur are quite definite.

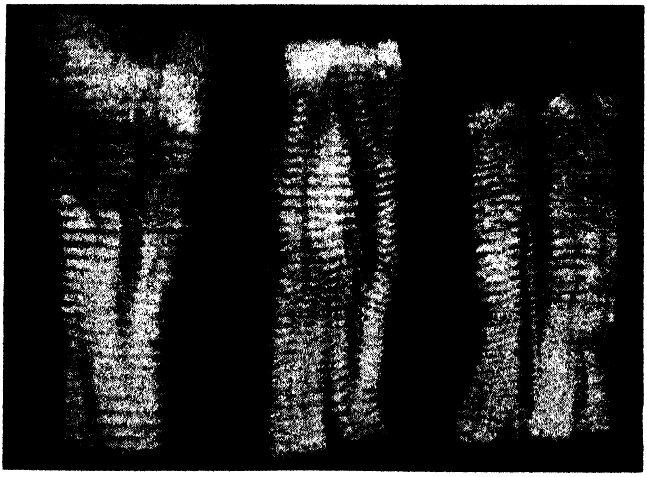
The normal character as indicated by the crimp of the wool is lost and in cases where the deficiency is a border-line case large "secondary waves," which appear to be superimposed on the crimp, appear. Plates 35 and 36 show typical cases.



1 2 3



4 5 6



7 8 9

Plate 35.

EFFECT OF COPPER DEFICIENCY ON WOOL.—Lower tier is of normal fleeces, middle tier of slightly affected fleeces, and upper tier of badly affected fleeces.

If the deficiency is accentuated the abnormality is more marked and, in extreme cases of deficiency, the wool is referred to as "steely," "stringy" or "silky." Probably "silky" is the most descriptive single term, as the crimp has almost completely disappeared, though there may be some indefinite waves and the wool has a typical glassy sheen, sometimes referred to as a "galvanised shine." The handle is soft and slippery and the general impression is that the affected wool has no "guts." The affected fleeces are not usually sound and when the whole length of the staple is affected there is no definite break but the wool is more inclined to be "rotten," in that the staple can be broken anywhere.

One interesting feature which must be borne in mind is that the abnormality in the wool will only occur in that part of the staple grown during the time in which there is insufficient copper to meet the demands of the sheep and after the liver stores have been exhausted. Typical "silky" wool has been seen on previously good-woolled stud rams some time after their introduction from sound country to copper deficient areas. When these animals have been returned to sound areas the wool has become normal again.

One of the most outstanding demonstrations of the importance of copper in the development of normal wool character is to be seen in Plate 36, which shows the wool from a merino and a crossbred sheep. These animals were introduced into a copper deficient area and after three months were shorn. The new wool showed typical "secondary waves" and these are clearly seen towards the tip end of the staples. Six months after shearing the animals were drenched at frequent and regular intervals with bluestone solution and the remarkable change is obvious. Adult sheep run on deficient areas are inclined to be a little unthrifty, though there are very few definite signs apart from the changes in the wool.

Some interesting observations have been made on black sheep running on country which is now known to be copper deficient. These animals showed intermittent white bands along the length of their black staples and there was a strong correlation between the occurrence of these white bands and the appearance of changes typical of copper deficiency in the wool of white sheep. In addition, the black pigment returned immediately to the wool of a black banded staple which was growing white wool when the animal was given copper drenches.

If weaners are subjected to a copper deficiency they produce abnormal wool, their general growth and development are slow and the sheep give the impression of being stunted and poorly grown. Eventually they may grow into reasonably good sheep, though they are inclined to lack the substance and size of animals grown on sound country. If ewes are subjected to a serious copper deficiency during the latter stages of pregnancy and if the copper status of the sheep does not improve soon after lambing a peculiar set of symptoms, followed by heavy mortalities of the lambs, may occur.

Lambs 1 to 2 months old are most commonly affected. The first signs are a check in growth rate and a tendency for the lambs to become unthrifty. If the lambs are driven for half-a-mile or so they begin to stagger and lose control of their hind limbs. Further forced exercise will accentuate the condition and within a few days of first being noticed the affected animal is capable only of travelling short

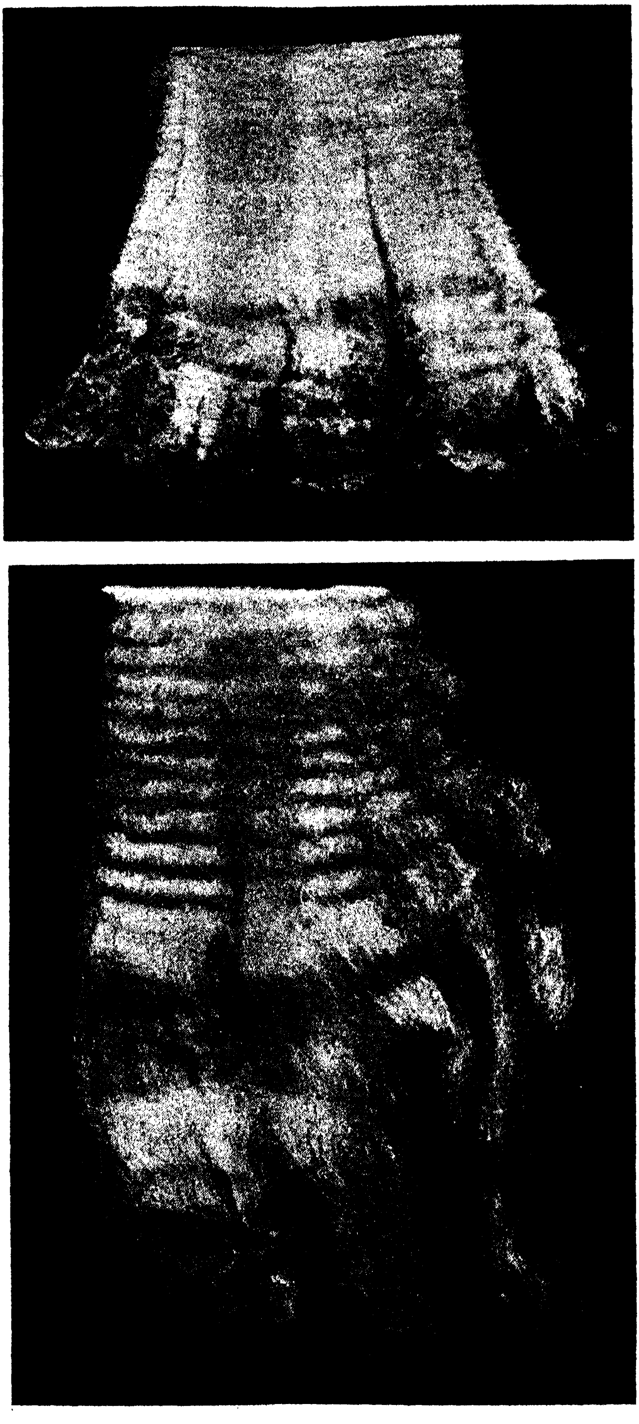


Plate 36.

WOOLS FROM MERINO AND CROSSBRED SHEEP IN WHICH THE BENEFICIAL EFFECT OF COPPER TREATMENT IS APPARENT.

distances. If attempts are made to force these lambs along they show an exaggerated back leg action, knuckle over at the pasterns, their hindquarters sway, and finally they go down. If left alone the affected lamb will get up again after a short rest but will be incapable of travelling very far. The disease progresses rapidly and the forelegs become affected and at this stage the lambs lie about in the paddock unable to rise. Their appetite is maintained, however, and they will crop all grass within reach and the animals appear bright and alert. Death usually occurs as the result of the activity of predators—foxes, eagle hawks, etc.

If the lambs do not develop the disease until they are three or four months old the course is generally much less severe. There is a check in growth rate and the abnormal swaying gait does not become apparent unless the sheep are driven. Such lambs often survive.

Overcoming a Copper Deficiency.

Before attempting to treat any disease condition in live stock it is first necessary to obtain a correct diagnosis as to the nature of the disease.

The diagnosis of a copper deficiency in sheep is based upon:

1. The occurrence of abnormal wool.
2. Chemical analysis of the liver and/or blood.
3. The clinical appearance and history of the sheep.

Obviously the carrying out of this work calls for close co-operation between those who produce wool, prepare the wool for sale, and handle the clips at sale time and the technical services which are available on application to the State Department of Agriculture and Stock. Wool samples may be submitted to the Department's Sheep and Wool Branch and where necessary investigatory follow-up work will be undertaken.

Copper deficiency is easily overcome by arranging a small regular intake of copper by the sheep.

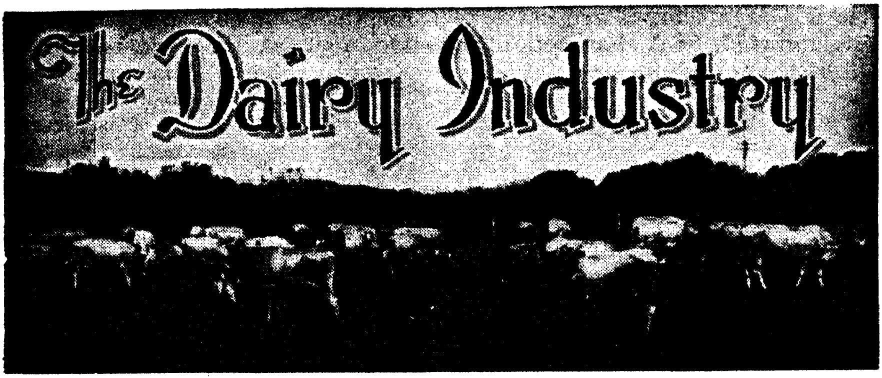
The exact way in which the copper is given will depend on local conditions. Under grazing conditions copper may be given to sheep through either the water or a suitable supplement.

Whether or not the copper can be given through the water will depend upon:

1. The type of water, i.e., surface, artesian or subartesian.
2. The composition of the various salts in solution in the water.
3. The type of water facilities which exist; that is, cement or metal troughs and holding tanks.

The greatest difficulty to be overcome in the feeding of copper in supplements is to prevent chronic copper poisoning which may result from the sheep eating too much of the supplement.

Because of these factors no hard and fast rules can be given. It is clear that the control measures adopted will depend entirely upon the local conditions on the individual properties and recommendations can be made only after full cognisance has been taken of all factors.



The Care of the Cream Separator.

E. SUTHERLAND, Dairy Adviser (Machinery).*

THE cream separator is obviously one of the most important pieces of machinery on the dairy farm, and, as with all machinery, its life and efficiency depend on proper care and attention. In many instances farmers are too casual concerning the care of separators, and it is quite common to find separators *loose on their foundation* and not *level.* It is not an exaggeration to say that seven out of ten separators are not level. When it is remembered that the wormwheel inside the separator, that is, the bronze wheel driving the spindle, travels at a speed of between 500 and 600 r.p.m. and the spindle and bowl at a speed of 7,000 r.p.m., it will be readily understood that any machinery travelling at such speeds should be on a firm foundation and should be *dead level.*

The importance of *correct oiling* cannot be too strongly stressed. Oil companies have spent thousands of pounds on research to enable them to tell the farmer the correct oil to use in his machinery. Do not use any oil in the separator except the particular grade recommended by the company from whom the separator was purchased. If the separator is of the splash feed oiling type, do not forget to change the oil in accordance with instructions. While doing this do not merely drain the old oil and pour the new oil in, but take an extra five minutes to remove the plate and clean out the sludge in the sump, because if the new oil is poured into a dirty sump the new oil only is being contaminated. Remember, oil can become so contaminated that it becomes an abrasive rather than a lubricant. Correct lubrication definitely pays dividends.

Concerning the *speed* of a separator, many farmers drive their separators at the wrong speed and adjust the cream screw to compensate for that incorrect speed. This is definitely wrong. The separator bowl is balanced to travel at a certain speed and it should be driven at that speed and then the cream screw adjusted accordingly. If turning a separator by hand, check the speed with a watch, because it has been found on tests that bells on separators indicating the speed are very often out of order. If the separator is power driven (the usual drive is from the engine to a counter-shaft and from the counter-shaft to the separator) avoid slipping belts. A slipping belt not only gives variation in speed and consequently variation in cream tests, but also drives the machinery along in a jerky manner and the jerks are conveyed right to the bowl of the separator.

---

* In a Country Hour broadcast talk, by courtesy of the Australian Broadcasting Commission

The *bowl* is the all-important part of the separator. The discs inside the bowl are separated by small metal tags fixed on the discs which are called caulks. These caulks wear down with use, and it will be found that at the end of, say, 12 or 18 months' wear (according to the size of the herd being milked) one or perhaps two extra discs can be added. An indication that discs are required is a slight wobble in the bowl. Another test is to take the bowl, rest it sideways on the palm of one hand and give the bottom a bump with the other hand; if the discs move at all, add another. There should be no movement of discs inside the bowl.

If the bowl is not at the correct height, particularly if it is too low, skimming becomes inefficient. A general direction concerning the adjustment of the *height of the bowl* cannot be given here, as different makers of separators have different ideas regarding this adjustment, but farmers are advised to check the height of the bowl by referring to the instruction book for their particular brand of separator.

The amount of milk entering the bowl, that is, the *inflow*, may require attention. If the usual supply tank on the separator has been discarded in favour of a large vat (as is generally the case when a farmer installs milking machines) the milk flowing into the bowl, particularly when the vat is full, should be controlled by turning the tap only until the float comes up to the tap with the milk flowing nicely over all of the float. The float does control the inflow to a certain extent, but it is usual for firms supplying large vats to fit them with a standard size tap, the farmer receiving the same size tap for a 75 gallons separator-vat as he would for a 90 gallons vat. As the milk goes down in the vat the tap can be turned on more. With too great an inflow the farmer may be expecting, say, a 50 gallons separator to do a 60 gallons job, which again results in inefficient skimming.

Towards the end of the separating do not starve the bowl; that is, do not let only a small amount of milk run from the tap for any length of time with the float well down away from the tap. This results in very thick cream being formed in the cream spout, which would be noticed after separating had finished. If the vat is of the flat-bottomed type, tilt it up near the end of the separating and so avoid just a trickle of milk running into the bowl.

To sum up: for long life and efficient working of a separator watch these points:—

1. **See that it is on a firm foundation and level.**
2. **Use the correct grade of oil.**
3. **See that the separator is turned at the correct speed.**
4. **Avoid slipping belts.**
5. **Check the height of the bowl.**
6. **Make sure that a sufficient number of discs is in the bowl.**
7. **See that the rate of inflow of milk is correct all through the separating, and**
8. **Towards the end of the separating do not starve the bowl.**

Feeding the Cow Before Calving.

T. K. KELLY, Dairy Officer.

WHILE the value of feeding the milking cow is appreciated, the value of providing adequate fodder for the cow before calving is often underestimated. The whole lactation is affected if cows are losing condition during the six weeks before calving. This is particularly true of first and second ''calvers'' which must provide for body growth.

Most dairy farmers aim at having most of their cows calving just before the succulent herbage growth season is expected to begin. This is sound on the principle that butterfat is produced at its cheapest from young succulent pasturage. However, it means that the cow is preparing for her lactation during the late winter and early spring months. This period, unfortunately, is often dry and consequently calls for wise management and the desirability of having reserve fodders.

A prerequisite is that the cow should have at least two months spell before calving again. This gives the dry cow an opportunity not only to nourish the unborn calf, but also to put condition on her body and provide a mineral reserve in her bones.

If a farm is incapable of growing and storing fodder, judicious stocking and pasture management should be practised. Should the pastures be dry or the soil known to be deficient in certain essential minerals, licks or mineral mixtures should be available to the stock. Dr. Hammond, of the Animal Nutrition Research Institute, Cambridge University, in his report on *The Conditions of Animal Production in Australia* observed that ''The feeding of calcium phosphate during this period (before calving) to obtain a body storage for the subsequent lactation is frequently neglected.'' A weekly allowance of from ½ lb. to 1 lb. of sterilized bonemeal maed attractive wtih either cereal meal (10 per cent.) or salt will be found beneficial in practically all coastal dairying districts.

On a farm where crops can be grown and fodder stored good fodder is never wasted on the cow before calving. A true dairy cow will milk off any surplus condition into the bucket. Silage and grain are valuable fodders. Lucerne hay is of particular value to the cow preparing for lactation because of its high lime content, in addition to its other feed qualities. All legumes are characterized by their high content of phosphoric acid and lime, particularly the lime.

Green fodder is a reliable food and tonic when pastures are dry. Sudan grass, panicum and Japanese millet are suited to most Queensland districts and should be sown early if sufficient rains fall for planting.

To have the cow ready for the job is comparable to having machinery ready for seasonal work. A cow during her early lactation has high inherent capacity for production, the limit varying with the inherent capacity of the individual. Thus capacity plus profit is wasted if the cow commences her lactation as an inefficient machine, in poor condition.

Hand Feeding of Dairy Cattle.

MOST dairymen have probably at some time, when hand feeding, asked themselves how much hay or chaff they should give their cattle. They have probably asked themselves how much hay or chaff the cattle can handle, how little they can do on, and what is the most economic method of feeding—a lot of roughage or a little roughage. The answers to these questions are of definite practical importance when hand feeding, points out a note by the Division of Animal Industry of the New South Wales Department of Agriculture.

For example, a farmer who had recently taken over a metropolitan dairy approached the New South Wales Department and said that, while his cows were producing well, and he thought he was feeding well, his feed bills took most of his milk cheques. What was wrong?

Consideration of the ration being fed quickly showed the reason. The ration was approximately—

Lucerne hay	22 lb.
Concentrate	8 lb.

The cattle were averaging 3 gallons per head per day. The cost of the ration was as follows:—

	Cost of Feed per ton	*Cost per lb.*	*Amount Fed. lb.*	*Cost.*
Lucerne hay	£10	approx. 1d.	22	22d
Concentrates	£8	approx. 1d.	8	8d
Total			30	30d

Approximate cost of feed per gallon—10d.

The roughage was the greater part of the weight and the greater part of the cost of the ration. Did the roughage provide a proportionate amount of the food value of the ration? In other words, was a food unit in the roughage as cheap as a food unit in the concentrate? Investigation showed that food units in the roughage were extremely expensive.

	Food Unit Value per 100 lb.	*Cost per ton.*	*Cost per Food Unit.*
Lucerne	40	£10	approx. 3d.
Concentrates	70	£8	" 1·4d.

That is, food units in the roughage were costing twice as much as food units in the concentrates.

The dairy farmer was advised to cut the lucerne hay down to about 10 lb. per day and increase his concentrate allowance up to about 14 lb. per day. This reduced his feeding cost to about 8d. per gallon—a 20 per cent. reduction in feeding cost.

A Sound General Rule.

It can be taken as a general rule that where roughage—that is hay or chaff—is bought, it is a much dearer source of food matter than concentrates, and should be fed only in limited amounts. That is, in amounts sufficient to provide some roughage in the ration.

Where roughage is grown on the farm, the advisability of feeding large or small amounts of roughage must depend on the cost of production of the roughage, and the price or cost of production of concentrates. If lucerne hay can be produced cheaply, such as at £3 per ton, or silage produced at £1 per ton, these roughages will be cheaper sources of food matter than concentrates at usual prices, and it would pay when hand feeding to give a full feed of roughage and only limited amounts of concentrates.

To summarise, when feeding bought hay or chaff, feed only a small amount, say 10 lb. per head, or even less. Where roughages are home-grown and cheaply produced, cheapest feeding will be produced by feeding large amounts of roughage (20 lb. or more of hay or chaff, or 60 lb. of silage where no grazing is available) and feeding only limited concentrates.

Plate 37.

BEEF COWS ON KINDON STATION, GOONDIWINDI DISTRICT, QUEENSLAND.

How Butter is Made.

F. B. COLEMAN, Senior Adviser in Dairying.*

TAKE the receiving platform of a typical Queensland butter factory as the starting point and watch the big motor lorries arrive laden with tons of cream. The cream carriers have been out among the farmers since early dawn, picking up their cream and are now converging on the factory from several directions. On the arrival of each load there is much bustle and noise, the banging of cans on steel plates, the noise of steam and the hum of machinery. The men work fast, tipping the cream from the heavy cans into the vats, as the platform has to be quickly cleared so as to avoid holding up the next load. The cans rattle along the conveyors to the scales where they are brought to a temporary standstill while the weight is recorded. These scales are very sensitive and are checked daily for accuracy.

To the Grader.

The cans now move a little further along the conveyor until they come to the cream grader, a man whose job it is to taste each can of cream for flavour, to examine it for any defects and to determine its quality. The senses of taste, smell and sight are used to assess quality. They are highly developed in the man doing this very important work, the quality of the resultant butter depending very largely on his skill and experience. He first stirs the cream vigorously with a steel stirring rod and takes a small quantity into a container which is placed in order in a numbered tray. These samples will be later tested by means of the Babcock Test to determine the percentage of butterfat, which forms the basis of payment to the supplier. The grade of the cream having been decided and recorded, it is moved along to the respective tipping vat, where it is tipped and the can inverted over a steam jet to remove the remnants of cream. The empty cans now commence the last section of their journey by moving along the conveyor to the can washer, a machine which washes and steams inside and out and finally dries the cans.

The Vacreator Room.

The cream then goes into the vacreator room, which is very large, airy and well lighted. Inside are clean tiled floors, gleaming white-tiled walls and shiny modern equipment. It is a picture of hygiene carried to a high standard. A ceaseless flow of ivory coloured cream is now on its way to large open vats, shaped somewhat like a bath but each holding some hundreds of gallons. The big volume of rich looking cream shows up in relief against the shiny, dark blue glass sides of the vats. Inside these vats, of which there may be four or five or more in a row, are big coils stretching from end to end. These are used for the circulation of hot water with which to warm the cream in winter time or for the circulation of brine for cooling and they are revolved so as to thoroughly mix the cream. The cream received may be fresh cream with a low percentage of lactic acid or older cream with a higher acidity. Seasonal and other differences cause this acidity to fluctuate so much that it is necessary to control it. This is done by a process called neutralization, which consists of the addition of a suitable alkali which neutralizes the acid. Acidity of the raw cream is accurately determined by test, the amount of alkali to be added is worked out from a chart and thus the ultimate percentage of acidity required can be ascertained. Neutralizing the acidity is necessary, as sour cream could not be pasteurized (i.e., heated) without curdling. In addition, neutralization permits of a more uniform quality butter being manufactured, prevents undesirable flavours resulting from the heating of sour cream, assists in removing objectionable volatile odours, prevents fat losses, and improves the keeping quality of the butter. The operator sets the coils moving in the vats previously described, and, as the cream is being circulated, the alkali solution is sprayed over the surface.

---

* In a Country Hour broadcast talk, by courtesy of the Australian Broadcasting Commission.

Cream under Vacuum Treatment.

The cream is now in a condition for the next treatment, which in the modern plant is called vacreation, or the treatment of cream under vacuum. Vacreation is the modern process of heating, purifying and partially cooling cream, which effects destruction of bacterial life, removal of chemical impurities, concentration, partial cooling and sweetening of flavour. The vacreator is a machine of gleaming metal, a mass of vertical cylinders, tubes, pipes, pressure and vacuum gauges and thermometers, and with its highly polished surfaces of stainless steel it looks most impressive. The process consists of passing the cream in a finely divided state, through live steam at a precisely controlled temperature, successively through several distinct degrees of vacuum, the whole cycle occurring within a few seconds. Deodorization is effected in two separate stages by washing with steam (in vacuo). Products resulting from previous bacterial action and any taint derived from feedstuffs are thereby eliminated.

To the Cooler.

We have now a product with a suitable acidity and such destruction of bacterial life as will enable the resultant butter to keep in good condition in cold storage until it is opened up in London a month or more later. From the vacreator the cream is pumped to the top of a large cooler. Water flows through the inside of the coils while cream is cooled by flowing over the outside. It then moves over another set of coils through which brine is circulated, the temperature being reduced to as low a temperature as required. From there it is pumped into big stainless steel or glass lined holding vats with revolving agitators. There it is held overnight and kept at a temperature low enough to inhibit bacterial development and to permit control of churning temperatures.

Churning.

Early the following morning the buttermaker comes into the picture and sets about preparing his churns. This he does by giving them a hot water followed by a cold water treatment. The churn itself may be a circular one capable of turning out 40 boxes of butter at one churning or the circular 100 box churn which stands nearly twice as high as the operator. The size of the latter churn can be imagined when it is realised that these huge wooden churns turn out more than two tons of butter at each churning. The cream is either run by gravity or pumped from the holding vats into the churn, which is then revolved in top gear for 30 to 40 minutes until a change or break in the cream occurs. The churn is then stopped and water added in order to keep the temperature low enough to obtain a firm grain, to reduce the viscosity of the cream and so on. The churn is then revolved again until the buttermilk is separated from the fat. On looking into the churn one can see a mass of golden grain about the size of wheat grain. The buttermilk is then drained off and pumped away. Wash water is next added with the object of removing remnants of buttermilk and so improving the keeping quality and to firm the grain to ensure an even incorporation of moisture and salt during the working of the butter. The churn is again set in motion for a few revolutions, then stopped and fine salt added with the object of bringing out desirable flavours, expelling moisture from the butter granules, improving keeping quality and slightly deepening the colour. Great care and skill have to be exercised by the buttermaker to ensure that the legal limits of moisture and salt are not exceeded and precise and accurate tests have to be done by him to safeguard this.

The Finished Product.

The buttermaker now sets the rollers inside the churn in motion and the butter, passing between pairs of rollers, is brought to a compact form with the moisture and salt evenly incorporated. The finished butter is now taken from the churn by means of a stainless steel trolley and wheeled into the packing room, where it is cut up into 56 lb. cubes, placed into boxes and finally stored in the cold room to await railage. Eventually it reaches the city, where it is strictly graded by Government graders before shipment overseas.

This description is necessarily brief but indicates sufficiently the high standard of butter manufacture which has been attained in Queensland. Great progress has been made during the last twenty years in the dairy industry, but it is becoming evident that in the not too distant future even the present efficient method of manufacture will be revolutionized.

VALUE OF HERD TESTING.

All experience goes to confirm the fact that it is not much use boasting about the bucket production of a dairy cow, unless it is proven by test.

When herd recording was first established in Queensland it was contended by many farmers that they could tell what their cows were capable of doing without putting them under test, merely by appraising the animal on the points which filled the eye—those outward characteristics usually identified with high producers—but a check-up on the farmers' judgment with the Babcock test showed their declared preferences to be based more on a guess than on proven or provable fact. That is not to say, of course, that a dairy farmer is not able to make a fairly accurate estimate of the productive capacity of the cows he is milking every day, but it is considered that such an estimate is not enough if he is looking for maximum profit.

As a point in dairy practice, it is suggested that the first aim of any farmer should be to determine which cows it pays best to feed. Without herd recording that cannot be done, satisfactorily anyhow. Many cows yield well, but their milk is not high enough in butter-fat content. Many apparently good milkers cannot stay the distance, falling off in production towards the end of their milking period.

Dairy farmers to-day know that mere guesswork can be costly in relation to milk and butter production, so an improved and simplified herd recording system would be widely welcomed.

By herd recording not only the low yielders are determined, but if the job is done systematically the way is clear for the culling of the light performers at the bucket in favour of the pick of the dairy herd. A regular check on the whole feeding and breeding programme also is advisable, so that herd improvement may become continuous. Moreover, regular testing adds to the farmer's interest in sound dairy practice.

If anyone has any doubt about the value of systematic herd testing, the district dairy adviser will provide plenty of solid arguments in its favour as part of an established dairy farm routine.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which qualified for entry into the Advanced Register of the Herd Books of the A.I.S., Jersey, Ayrshire, and Guernsey Societies, production records for which have been compiled during the month of May, 1946 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
MATURE COW (STANDARD 350 LB.).				
Rhodesview Royal Primrose 2nd	W. Gierke and Sons, Helidon	11,502·2	525·603	Fairvale Major
Tabbagong Beauty 30th (251 days)	J. Phillips, Wondai	13,282·9	510·566	Parkview Royalist
Ennismore Emma	E. W. Jackson, Nobby	10,204·15	403·225	Navillus Amy's Sheik
Sunnyview Locket (251 days)	J. Phillips, Wondai	10,980·45	402·535	Burradale Byron
Springleigh Buttercup 8th	H. F. Moller, Boonah	8,243·55	364·842	Burradale Ronald
Chelmer Ethel	G. Francis, Kumbia	9,766·6	362·253	Greyleigh Victory
SENIOR, 4 YEARS (STANDARD 330 LB.).				
Penrhos Stella 10th	Sullivan Bros., Pittsworth	9,534·71	363·164	Penrhos Sovereign
Ardilea Nessie 6th	W. Hinrichsen and Sons, Clifton	8,591·25	348·488	Newstead Reliance
Rhodesview Lincoln 2nd	W. Gierke and Sons, Helidon	7,782·75	331·409	Rhodesview Supreme
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Valera Una	Sullivan Bros., Pittsworth	9,499·53	384·094	Rosenthal Pendants Prince
Ennismore Remona 2nd	E. W. Jackson, Nobby	9,440·4	366·427	Navillus Prince Henry
Euroa Lauretta 3rd	P. R. Emery, Dallarnil	7,629·5	334·498	Dnalwon Sceptre
Aynesley Gem 4th	G. Francis, Kumbia	8,121·05	33[illegible]·749	Alfa Vale Pride 6th
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Rosenthal Rosebud 22nd	D. Robinson, Womina	8,459·88	326·969	Rosenthal Perfection
Rhodesview Nancy 47th	W. Gierke and Sons, Helidon	7,744·85	316·794	Blacklands Prospector
Ardilea Nessie 7th	W. Hinrichsen and Sons, Clifton	7,564·5	296·210	Newstead Reliance
JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Fairvale Fuschsia 5th	F. B. Sullivan, Pittsworth	9,161·25	373·377	Alfa Vale Pride 2nd
Rhodesview Fussy 6th	W. Gierke and Sons, Helidon	7,501·25	344·123	Rhodesview Neal
Valera Lila 9th	D. Sullivan, Pittsworth	7,913·75	317·814	Rosenthal Surplus 2nd
Sydmouth Violet	T. Vayro, Helidon	7,165·65	305·396	Mount Blow Security
Mount Camp Truesign	Madge Bros., Southbrook	7,365·14	283·861	Rosenthal Red Major
Rhodesview Nancy 51st	W. Gierke and Sons, Helidon	6,200·	276·784	Fairvale Major
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Glen Idol Florrie 9th	Estate P. Doherty, Gympie	8,335·4	340·933	Blackland's Count
Mount Camp Thelma 34th	Madge Bros., Southbrook	8,228·64	328·746	Rosenthal Red Major
Bantry Nellie	D. Sullivan, Pittsworth	8,163·25	316·295	Penrhos Blossom's Prince
Tara Daphne 2nd	Mrs. K. Henry, Watts' Siding	7,631·1	298·652	Alfa Vale Plummer
Fairvale Doris V.	I. B. Skerman, Kaimkillenbun	7,273·18	270·818	Fairvale Sir Echo
Tara Hope	Mrs. K. Henry, Watts' Siding	5,902·2	257·532	Murray's Bridge Pansy's Gift
Valera Trixie 6th	F. B. Sullivan, Pittsworth	7,389·18	319·464	Alfa Vale Pride 2nd
Glen Idol Daphne 14th	Estate P. Doherty, Gympie	6,995·	298·790	Blackland's Count
Valera Una 4th	Sullivan Bros., Pittsworth	7,178·90	296·747	Alfa Vale Pride 2nd
Bpringlea Pretty Jean 2nd	J. E. Heath, Murgon	8,291·2	291·386	Alfa Vale Lieutenant
Sunyaview Fuchsia 31st	R. Moore, Kingaroy	7,235·15	285·476	Trevor Hill Reception
Ripley Park Rosebud II.	I. B. Skerman, Kaimkillenbun	6,991·7	271·056	Esrom Wee McGregor
Ripley Park Rosette II.	I. B. Skerman, Kaimkillenbun	7,357·19	266·250	Esrom Wee McGregor

JERSEY.

Mature Cow (Standard 350 Lb.).

Palen Poppy	Prison Farm, Palen Creek	6,666·85	402·185	Oxford Card
Trecarne Jersey Queen 2nd	T. A. Petherick, Lockyer	7,665·35	397·963	Trinity Some Officer
Romsey Blossom	J. Wilton, Killarney	7,948·42	394·331	Oxford Dainty Peer
Romsey Dainty Rose	J. Wilton, Killarney	6,716·	358·837	Oxford Dainty Peer

Senior, 4 Years (Standard 330 Lb.).

Lynford Kitty	F. H. Sippell, Murgon	8,201·4	340·000	Glengariffe Cunning Cossack

Junior, 4 Years (Standard 310 Lb.).

Kathleigh Silver 2nd	F. W. Kath, Dalby	9,497·76	522·002	Oxford Daffodil's Victor
Glenrandle Golden Girl	P. Kerlin, Killarney	6,552·	334·741	Bellgarth Stylish
Trecarne Golden Dairy Girl 2nd	T. A. Petherick, Lockyer	6,253·95	324·466	Brampton, Daffodil's Peer

Senior, 3 Years (Standard 290 Lb.).

Kathleigh Biscuit	F. W. Kath, Dalby	8,140·01	481·689	Oxford Daffodil's Victor

Junior, 3 Years (Standard 270 Lb.).

Le Nid Judy	W. C. Paroz, Biloela	6,572·45	330·520	Westbrook Aster's Lad 39
Trecarne Daffodil's 2nd	T. A. Petherick, Lockyer	5,478·1	303·198	Brampron Daffodil's Peer
Rosehill Margaret	A. Huth, Milbong	6,356·4	285·217	Carnation Successor

Senior, 2 Years (Standard 250 Lb.).

Ashview Lady 2nd	C. Huey, Sabine	6,629·	405·366	Trecarne Victor 4th
Romsey Bonnie	J. Wilton, Killarney	6,418·02	344·778	Oxford Pixie's Victor
Woodview Ladyette	P. H. Schull, Oakey	5,010·4	285·635	Treccarne Royal Officer

Junior, 2 Years (Standard 230 Lb.).

Strathdean Gentle Jean	S. H. Caldwell, Bell	6,518·65	392·638	Oxford King's Victor
Marshland's Royal Lady (imp. N.Z.)	F. W. Kath, Dalby	7,026·62	390·669	Brampton Dreaming Royal
Strathdean Delilah	S. H. Caldwell, Bell	6,968·67	382·525	Oxford King's Victor
Glenrandle Lucy	P. Kerlin, Killarney	6,819·3	360·438	Bellgarth Glory King
Lermont Brightgirl	J. Schull and Sons, Oakey	5,641·6	325·535	Selsey Samare's Hallmark
Primrose Sweet Nell	T. Little, Clifton	5,256·1	306·136	Sunny Glen Masterman
Bellgarth Bluebell (255 days)	P. Kerlin, Killarney	5,025·5	294·524	Oxford of Fawn's Victor
Nairfale Lady Laura	R. P. Browne, Yangan	5,334·2	283·334	Nairfale Noble Count
Le Nid Princess	W. C. Paroz, Biloela	4,693·25	270·525	Westbrook Aster's Lad 39th
Winston Envy	A. Huth, Milbong	5,087·9	258·419	Brookland's Twiddler
Oxlea Golden Belle	L. Oxenford, Oxenford	4,825·75	248·338	Oxlea Golden Lad
Le Nid Gaynor	W. C. Paroz, Biloela	4,364·95	240·893	Westbrook Aster's Lad 39th
Trecarne Jerseybell 2nd	T. A. Petherick, Lockyer	4,666·2	239·486	Trecarne Ruler 2nd
Palen Nancy	Prison Farm, Palen Creek	4,718·6	237·503	Banyule Silvermine Oxford

AYRSHIRE.

Senior, 3 Years (Standard 290 Lb.).

Benbecula Twinkle	N. C. Mann, Broxburn	9,554·54	353·999	Benbecula Felix 2nd

Senior, 2 Years (Standard 250 Lb.).

Crescent Farm Betty	N. C. Mann, Broxburn	7,832·67	285·351	Myola Orphan Boy

Junior, 2 Years (Standard 230 Lb.).

Crescent Farm Lady Bell	N. C. Mann, Broxburn	8,189·39	292·319	Myola Orphan Boy
Crescent Farm Beautiful Maid	N. C. Mann, Broxburn	6,920·26	246·828	Myola Orphan Boy
Crescent Farm Peggy's Pride	N. C. Mann, Broxburn	6,538·82	245·023	Myola Orphan Boy

GUERNSEY.

Junior, 2 Year (Standard 230 Lb.).

Linwood Bittern	E. G. Foxton, Maleny	7,633·65	376·102	Warrawong Winter

Plate 38.

A GOOD CUT FOR FODDER CONSERVATION—A Field Scene near Goondiwindi.

The Bacon Pig.

F. BOSTOCK, Officer in Charge, Pig Branch.

THE Pig Industry to-day is beginning to receive the closer attention of farmers, which it should have been given years ago, instead of being looked upon as a side-line to dairying. However it must be realised that the day of "hit and miss" methods in building up a successful local and export trade have gone forever. In these times of keen competition success can only be attained by farmers who are prepared to study the demands of the consumer and realise that a first class product cannot be produced from a second class pig, no matter how efficient factory management or cure may be.

Much depends on the careful selection of boars and sows, therefore when choosing breeding stock, very careful consideration should be given to their selection. It is very true that far too many pigs of wrong type are brought on to farms where brood stock selection has not received proper attention.

To assist in this selection of breeding stock the conformation of a bacon pig should be better understood and the following points should be considered:—

Starting at the head and working back through the body, first we can consider the—

Head with Jowl and Neck, which consists largely of bone and is of low value, therefore it should be light, with no coarse fat at the jowl or neck.

Shoulders and Fore End should be light, free from wrinkles and coarseness. The collar consists largely of overlapping muscles and gristle and is a cheap cut.

Back should be long and level; it demands a high price per lb. and length means quantity, while level denotes weight and depth of loin. The fat not to exceed 1½ inches at any point.

Sides should be level and moderately deep. Distention of the lower part is accompanied by thin belly cuts, while a moderately deep side affords good depth of prime back cuts and undercuts.

Underline to be straight. The thin streaky and flank cuts are not unduly distended or thin.

Belly should be thick in flesh, because the value is increased by thickness.

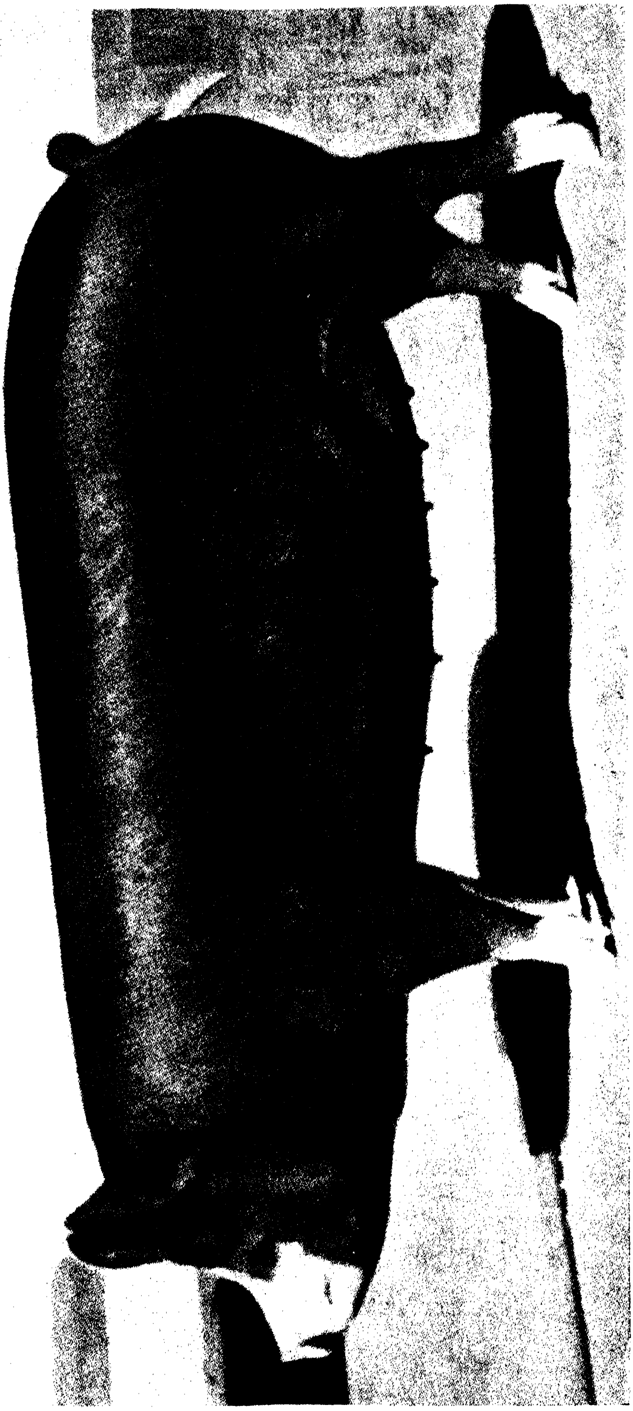


Plate 39.

CORRECT-TYPE BACONER.

Flank to be thick and handle firm and should be in line with the sides.

Ham to be broad, wide, and deep to the hock. These characteristics denote plenty of flesh. No depression should be visible at the tail, as it indicates excessive fat.

Tail to be set high, which denotes a higher proportion of flesh than when set low. However, a tail set too high indicates excessive backfat.

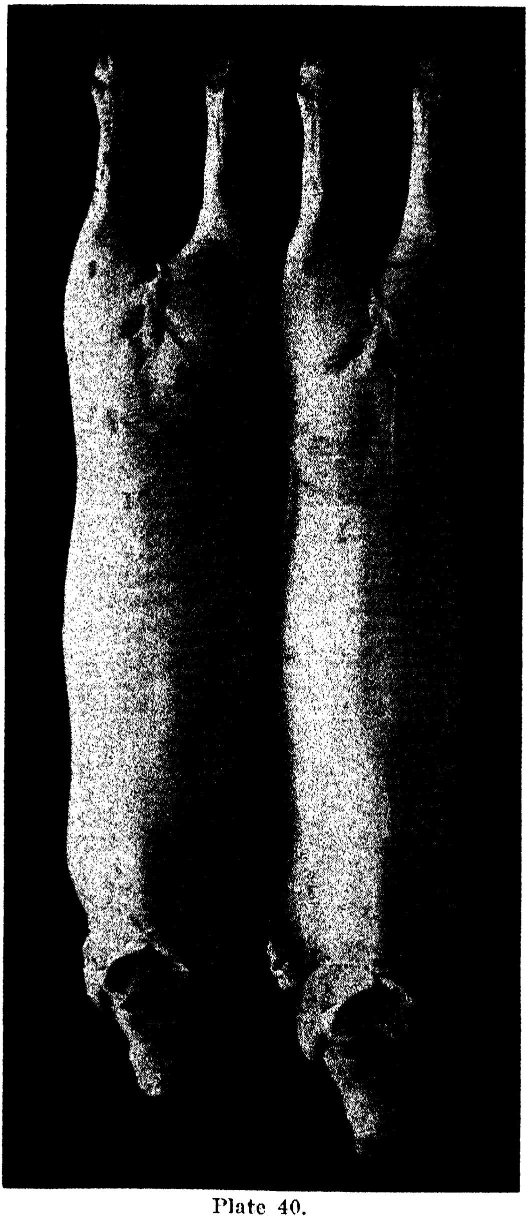


Plate 40.

COMPARISON IN CARCASS LENGTH.

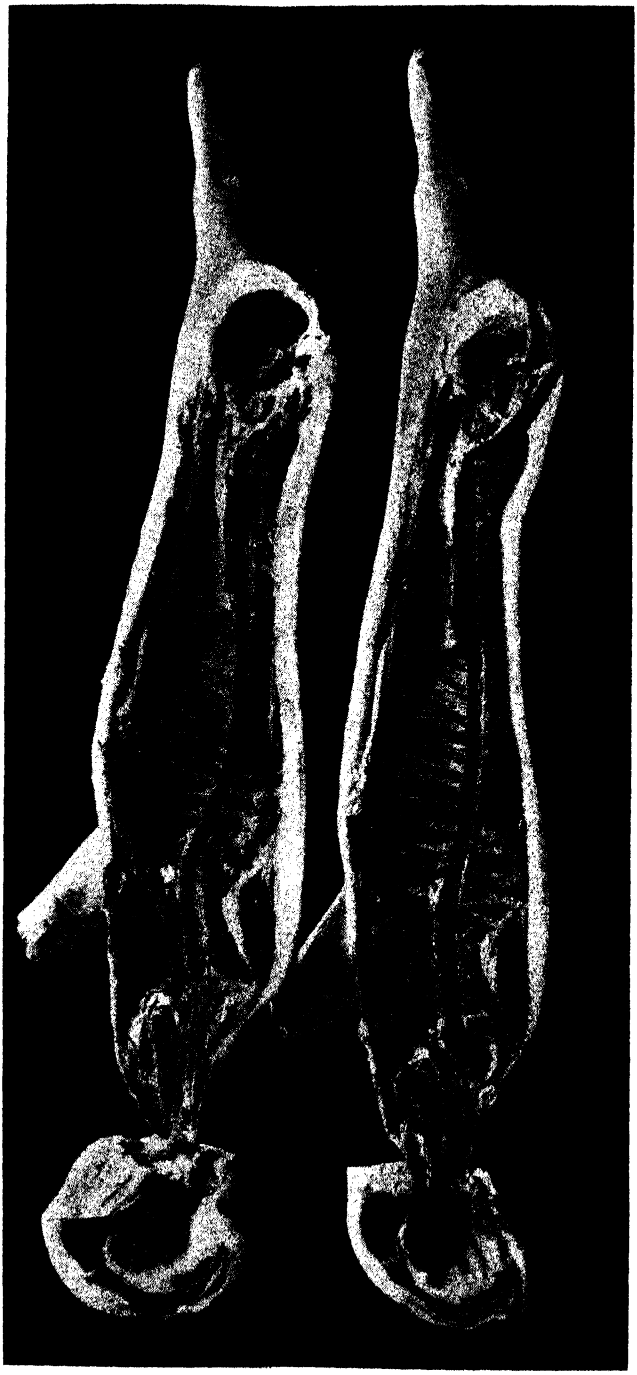


Plate 41.
COMPARISON OF FAT DEVELOPMENT.

Legs set wide apart and the pig standing well up on its toes.

Bone to be fine, which indicates quality and does not detract from weight.

Skin must be free from coarseness and wrinkles.

Hair to be fine, indicating breeding.

Now, consider briefly the pig after slaughter, by a description of the main carcass points, which may be divided into three sections. 1. Marketing points—colour, skin and dressing. 2. Breeders' points by inspection, and 3. Breeders' points by measurement. (Hammond System.)

Colour should be a clean fresh white; dark colouration due to pigmented skin; sunburn before slaughter or excessive drying in storage should be avoided.

Skin should be smooth and not too thick or coarse.

Dressing.—Bruises and weals due to fighting before slaughter, hits from sticks, kicks when loading, or bruises from fighting in truck or lorry should be absent. There should be a complete absence of hair or scraper cuts.

Breeders' points by inspection.

Hams.—The bone should be fine and ham well filled out with lean meat. The space between the legs U rather than V shaped.

Shoulders.—These should be light in proportion to the rest of the carcass, because it is a low priced cut.

Streak.—Not only should the belly be thick, but it should contain a high proportion of lean meat.

Breeders' points by measurements.

Body Length.—This is measured from the edge of the pubis bone to the junction of the sternum with the first rib. It gives a measure of the length of the valuable loin joint, which can be cut from the carcass. A high proportion of this to the weight of carcass as a whole increases the value for cutting purposes.

Leg Length.—This is measured in a straight line from the edge of the pubis bone to the tip of the toe. When taken in relation to weight of carcass, it gives a measure of the amount of bone in the carcass.

The side is now cut through at the level of the last rib. This position was selected, because not only does it expose the most valuable part, but also the latest developing part of the carcass, thus affording the best index of the state of the development of the carcass as a whole.

Eye Muscle of Loin.—The thickness is measured half-way along its width. This gives the best measure of lean meat throughout the carcass. Different carcasses vary much more in thickness than in width of the muscle.

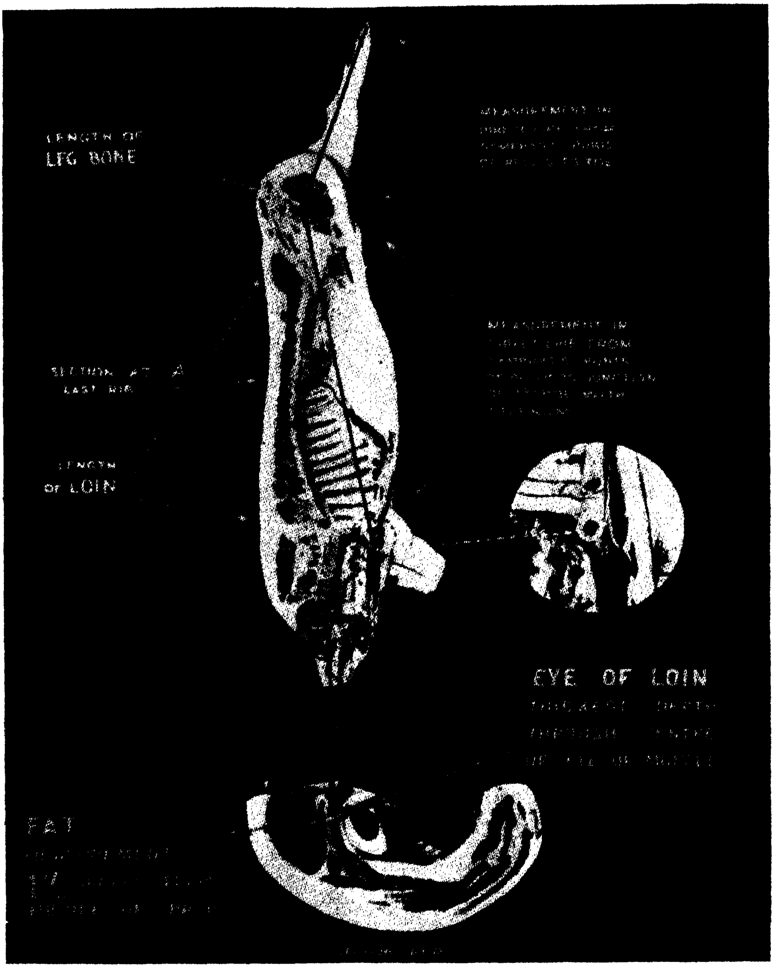


Plate 42.
HAMMOND SYSTEM OF CARCASS JUDGING.

Backfat.—This is measured 1½ inches from the middle line, with one point of the callipers at the edge of the eye muscle and the other just on the inner layer of the skin. This gives a better measure of the amount of fat in the carcass than does the measurement of the fat at the shoulder, because it is the last part of the back to develop.

Having considered the conformation of the different parts of bacon pig, but, while good conformation is very necessary, sight should not be lost of the fact that it does not altogether denote good quality meat, which so largely depends on feeding.

Breeding exerts the greatest influence on the general conformation, but feeding influences the quality of the flesh, also colour and texture of the meat and, to some extent, the quality of the bone.

REGISTERED HATCHERIES

REGISTRATION of poultry hatcheries entails blood testing and the removal of birds found to be affected with pullorum disease, or are otherwise unsuitable for breeding purposes.

Owner.	Name of Hatchery.	Breeds.
V. H. Allen, Oxley road, Oxley	Alaura	White Leghorns, Australorps, Langshans, and Rhode Island Reds
I. M. Armstrong, Randall road, Wynnum West	Chanticleer	Australorps
P. R. Bach, Cleveland		Australorps and White Leghorns
Mrs. E. A. Baltzer, 10 Mary street, Toowoomba	Austral	White Leghorns
J. S. Bauer, Oakwood, Bundaberg	Triangle	Australorps and White Leghorns
Beach Bros., Wellington Point	Brach Bros.	Australorps and White Leghorns
J. M. Beccaris, Harvey's Range road, Townsville	Winova	Australorps, White Leghorns, and Rhode Island Reds
H. Brazil, Beaudesert road, Cooper's Plains	Brazil's	Australorps and White Leghorns
D. L. Burns, Brisbane road, Redcliffe	Yalta	White Leghorns and Australorps
P. J. C. Bygrave, Robinson road, Aspley	Craigan Farm	White Leghorns and Australorps
M. H. Campbell, Albany Creek, Aspley	Mahaca	White Leghorns and Australorps
W. Carr, A. B. and A. T. M. Watson, Logan and Creek roads, Mount Gravatt	Bellview	Australorps, White Leghorns, Minorcas, and Rhode Island Reds
J. L. Carrick and Son, Manly road, Tingalpa	Craigard	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton	White Leghorns
A. R. Chard, Chard's road, Bundaberg	Sunnyland	Australorps and White and Brown Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
A. Cowley, The Gap	Melody	White Leghorns and Australorps
A. J. Daniels, Moongan	Daniel's	White Leghorns, Australorps, Anconas, Brown Leghorns, and Rhode Island Reds
T. Duval, New Lindum road, Wynnum West		Australorps and White Leghorns
E. Dearling, Haden		White Leghorns and Australorps
V. R. Dearling, 85 Holberton street, Toowoomba		White Leghorns, Australorps, and Brown Leghorns
Dixon Bros., Wondecla	Dixon Bros.	White Leghorns
E. Eckert Head street, Laidley		Australorps, Langshans, and White Leghorns
A. W. Edwards, Stenner street, Middle Ridge		Australorps and White Leghorns
C. L. Eggar, Moggill	Rosehill	Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner	Australorps
Elks and Sudlow, Beerwah	Woodlands	White Leghorns and Australorps
W. Ellison, junr., Bald Knob, Landsborough	Willeden Plantation	White Leghorns and Australorps
B. E. W. Frederich, Oxley road, Corinda	Glenalbyn	Australorps
N. H. Gibson, Manly road, Tingalpa	Gibson's	Australorps and White Leghorns
Gisler Bros., Wynnum	Gisler Bros.	Australorps and White Leghorns
R. T. Green, 116 North street, Toowoomba		White, Black, and Brown Leghorns, Australorps, and Langshans
W. G. Gregory, Deeragun	Rocks	White Leghorns, Australorps, and Rhode Island Reds
T. L. Griffiths, Margaret street, Silkstone, Ipswich	Hillcrest	White Leghorns and Australorps
J. W. Grigg, Tumoulin		Australorps and White Leghorns
F. P. Grillmeier, Milman	Mountain View	Australorps and Minorcas
T. A. Haggquist, Edmonton	White Rocks	White Leghorns
P. E. and G. G. Hannay, Ridley road, Aspley	Sunnyhill	White Leghorns and Australorps
C. Hartmann, Box 73, Pittsworth	Vigor	Australorps, White and Black Leghorns
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
L. G. Higgins, Middle Ridge, Toowoomba		Anconas, Rhode Island Reds, and White Leghorns
F. E. Hills, Sims road, Bundaberg	Littlemore	Australorps, Rhode Island Reds, White Leghorns, White Wyandottes, and Langshans
A. H. Hillenberg, Crow's Nest		Australorps
Hodgen Bros., Spring street, Middle Ridge	Austral	White Leghorns and Australorps
A. E. Hoopert, 24 Greenwattle street, Toowoomba	Kensington	Australorps and Rhode Island Reds
H. Hufschmid, Ellison road, Geebung	Meadowbank	White and Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds

REGISTERED HATCHERIES—*continued.*

Owner.	Name of Hatchery.	Breeds.
Mrs. E. R. Hurren, 44A Herries street, Toowoomba	..	White Leghorns and Australorps
H. Jones, Ridgelands	Jolly Farm	Langshans, Australorps. White Leghorns, White Wyandottes
A. **J. F. Jull**, Stradmore, Ramsay street, Middle Ridge	Stradmore	White Leghorns
W. Kelly, Parkhurst, via North Rockhampton	..	White Leghorns, Australorps, and Rhode Island Reds
R. **H. Kennedy**, 357 Bridge street, Toowoomba	..	White Leghorns, Australorps, and Rhode Island Reds
F. E. Kipee, 40 Hurlsey road, Toowoomba	..	White Leghorns
E. C. Kolberg, Handford road, Zillmere	Gerbera	Australorps
F. Le Breton, Bald Knob, via Landsborough	Pagoda	White Leghorns
W. A. Lehfeldt, Kalapa	Lehfeldt's	Australorps
W. A. Luke, 108 Russell street, Toowoomba	Downs	White and Brown Leghorns, Australorps, and Rhode Island Reds
J. McCulloch, White's road, Manly	Hindes	White Leghorns and Australorps
A. Malvine Waterworks road, The Gap	Alva	White Leghorns and Australorps
A. Mawhinney, Robinson road, Aspley	Aspley	White Leghorns, Australorps, and Rhode Island Reds
Mrs. P. W. E. Maynard, Doonside, via Dalby	..	Australorps and White Leghorns
W. S. MacDonald, Babinda	Redbird	Rhode Island Reds and Anconas
F. Maxfield, 60 Holberton street, Toowoomba	Braeside	White Leghorns
C. J. Mengel, New Lindum road, Wynnum West	Mengels	Australorps
F. J. Miller, 305 Bridge street, Toowoomba	Rhode Island Red	White Leghorns
J. A. Miller, Racecourse road, Charters Towers	Hillview	White Leghorns
H. H. Millman, Haly street, Kingaroy	Kingaroy	Australorps, White Leghorns, Wyandottes and Plymouth Rocks
F. S. Morrison, Kenmore	Dunglass	Australorps
C. J. Nielsen, Kensington street, Bundaberg	Bona Vista	Australorps, Rhode Island Reds, and White Leghorns
S. V. Norup, Beaudesert road, Cooper's Plains	Norups	White Leghorns and Australorps
H. Obst and Sons, Shepperd	College Holme	White Leghorns and Rhode Island Reds
H. W. and C. E. E. Olsen, Marmor	Squaredeal	White, Black, and Brown Leghorns, Anconas, and Australorps
E. E. Palmer, Greenmount	..	Rhode Island Reds
A. C. Pearce, Marlborough	Marlborough	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell and Runner Ducks, and Bronze Turkeys
W. J. Perkins, 110 Dearling street, Toowoomba	Rhode Island Red	Rhode Island Reds
A. J. Philp, Upper Sheridan street, Cairns	Aerodrome	White Leghorns, Australorps, Rhode Island Reds, Anconas, and Light Sussex
G. **Pitt**, Box 132, Bundaberg	Pitts'	White Wyandottes, White and Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
Mrs. M. Price, care Post Office, Macalister	..	Australorps and White Leghorns
F. M. G. Proellocks, 81 Herries street, Toowoomba	Vale View	White Leghorns
J. **C. and G. E. Raff**, Musgrave road, Sunnybank	Brundholme	White Leghorns, Australorps, and Rhode Island Reds
G. R. Rawson and Son, Mains road, Sunnybank	Sunbeam	White Leghorns, Australorps, and Black and Brown Leghorns
C. **G. A. Rivers**, Tamaree	Tamaree	Rhode Island Reds and White Leghorns
C. Roberts, Trout road, Aspley	..	White Leghorns
J. Rogoff, 423 Logan road, Stone's Corner	Kingston road	Australorps
C. L. Schlencker, Handford road, Zillmere	Windyridge	White Leghorns and Australorps
P. H. Scotney, Priest street, Toowoomba	..	White Leghorns and Rhode Island Reds
J. Schumann, 291 Bridge street, Toowoomba	..	White and Brown Leghorns, Rhode Island Reds, and Australorps
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa	White Leghorns and Australorps
N. G. Seymour, Ipswich road, Darra	Sohufa	White and Black Leghorns and Australorps
R. E. Slaughter, Handford road, Zillmere	Monarch	Australorps and White Leghorns
H. A. Springall, Progress street, Tingalpa	Springfield	White Leghorns
A. W. Stehn and Son, 285 West street, Toowoomba	Red Spot	Australorps, Rhode Island Reds, White and Brown Leghorns
J. P. Skelly, Helidon	Helidon	Australorps and White Leghorns
W. B. Slawson, Fraser road, Mitchelton	..	White Leghorns, Australorps, and Light Breeds
T. Smith, Isis Junction	Fairview	White Leghorns and Australorps
P. W. Stark, Crow's Nest	Austral	Australorps
H. M. Stephens, 160 Barolin street, Bundaberg	Barolin Stud	Australorps and White Leghorns
J. Stevenson, Dragon street, South Warwick	Ivanhoe	Rhode Island Reds, White Leghorns, and Australorps

REGISTERED HATCHERIES—*continued.*

Owner.	Name of Hatchery.	Breeds.
R. Stockman, Kairi	Tinaroo	White Leghorns and Rhode Island Reds
A. H. Tebbutt, Stewart terrace, Gympie	Delrae	White Leghorns, White Wyandottes, and Australorps
A. G. Tietzel, West street, Aitkenvale, Townsville	Tietzel's	White Leghorns and Australorps
R. M. Thomson, Parkhurst, North Rockhampton	..	Australorps
H. G. Thorpe, Box 36, Goomeri	Thorburn	White Leghorns, Australorps, and Rhode Island Reds
G. L. Vogler and M. E. Hooper, Kenmore	Stonehenge	White Leghorns and Australorps
W. Warren, Progress street, Tingalpa	..	White Leghorns and Australorps
N. J. Watson, Lister street, Sunnybank	Glencoe	Australorps and White Leghorns
Mrs. V. M. White, Archerfield road, Darra	Viola	White Leghorns and Australorps
P. A. Willson, Board street, Deagon	Myara	White Leghorns and Australorps
G. A. C. Weaver, Herberton road, Atherton	Weaver's	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams
F. H. J. Weeks, Bajool	Glen Brae	White Leghorns and Australorps
Miss I. G. Winter, 761 Ruthven street, Toowoomba	..	White Leghorns
Miss L. M. Wooller, Huet street, Rockhampton	Riverview	Rhode Island Reds, White Leghorns, and Australorps
P. A. Wright, Laidley	Chillowdeane	White and Brown Leghorns and Australorps
A. Wruck, Main road, Upper Brookfield	Wrucks	White Leghorns and Australorps

Plate 43.

The Eungella Range Road, near Mackay, Queensland.

ANIMAL HEALTH

The Buffalo Fly.

F. H. S. ROBERTS, Animal Health Station, Yeerongpilly.

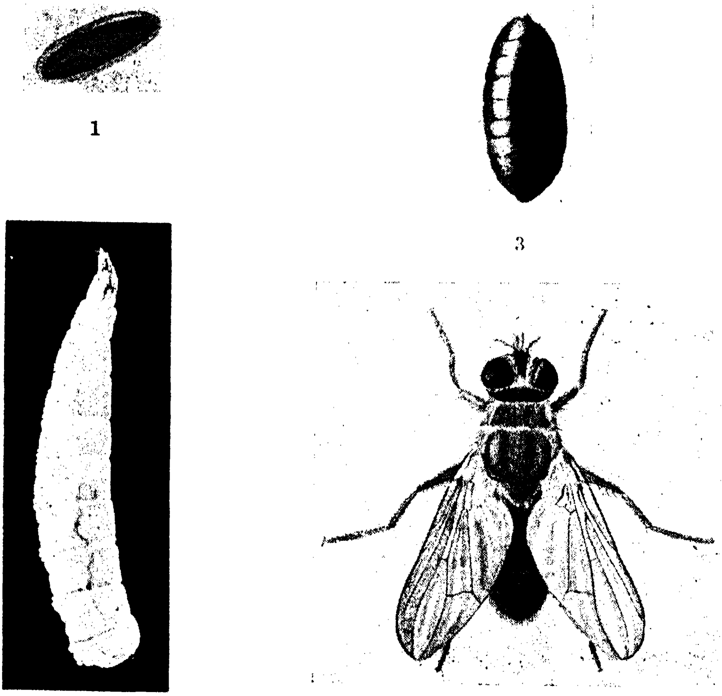
THE two most important pests of cattle in Australia are the cattle tick and the buffalo fly. Both of these were introduced into the Northern Territory from the East. The buffalo fly arrived on buffaloes in 1828. During the next 100 years it spread across to the northern coast of West Australia and over the border into north-west Queensland. Immediately it appeared here regulations were enforced whereby cattle could travel from this area only after being sprayed with a repellant fluid at railhead. These restrictions prevented the fly from spreading for over ten years, but in 1939 an abnormal and prolonged wet season permitted it to move rapidly eastwards across the Gulf of Carpentaria. This movement continued in subsequent years and, in the summer of 1942-43, it occupied all dairying areas on the east coast of Queensland as far south as Townsville. Its advance south from here has been rapid. Any attempts at this stage to forecast the southern limit of its distribution, or, rather, how far south it will go before it ceases to be a pest, would be simply guessing. It is expected that the fly will cling mainly to the coastal areas. It will probably progress some distance inland, but this is dependent upon temperatures and rainfall. Low temperatures and dry conditions are unfavourable.

DESCRIPTION AND HABITS.

The parasite (Plate 44, fig. 4) is about half the size of a common house fly. It is usually associated only with cattle and buffaloes, but will also attack horses, sheep, pigs, dogs, and man, but only when these are close to cattle, for the fly can live only where cattle and buffaloes are found. Among cattle, it has a preference for bulls, stags, aged cows, and beasts in poor condition. Calves generally carry relatively few flies. It lives on blood and has a very painful bite. A few flies are of little importance but, when conditions are favourable, single animals may harbour several hundred to a few thousand flies. They congregate in greatest numbers around the withers, shoulders, and flanks, but on windy and rainy days they move to more sheltered positions. The spread from beast to beast is by flight, and when disturbed the flies rise in a swarm and settle again very rapidly. It is not known how far buffalo flies can travel in flight. The distance is at least two miles, and is probably greater. The irritation caused when they pierce the skin and suck blood prevents the animals from feeding and resting. They are kept on the move trying to find some relief. Beef cattle lose condition or fail to fatten. Among dairy cattle the fly is considered to affect the milk yield. A proven source of very serious loss is the damage caused to the hides by the efforts of the animals to rid themselves of the pests by rubbing against fence posts and trees. As the animals become accustomed to the flies, however, they become less worried and the ill effects are less conspicuous.

LIFE HISTORY.

The buffalo fly lays its eggs in the freshly dropped dung of cattle and buffaloes. The egg (Plate 44, fig. 1) hatches in about 24 hours and the maggot which emerges feeds in the dung. It is a typical fly maggot and is fully grown in about 4 days when it is about $\frac{1}{4}$ inch in length. The fully-grown maggot (Plate 44, fig. 2) then descends into the lower parts of the dung or into the soil and becomes a small, brown, barrel-like body $\frac{1}{8}$ inch long (Plate 44, fig. 3). Inside this puparium, as it is called, the adult fly is formed and in about 4 days the fly emerges, dries its wings and flies off. Thus, in summer time, a new generation may be seen every 8 or 9 days, which means that, under favourable conditions, the flies can increase very rapidly. There is little information as to how long flies will live on an animal, but this may be several weeks. Once removed from their host, however, they rarely live longer than about 24 hours.



1 2 3 4

Plate 44.

The Buffalo Fly: Fig. 1.—Egg x 30; Fig. 2.—Larva x 16; Fig. 3.—Pupa x 16; Fig. 4.—Adult fly x 16.

[*Drawn by I. W. Helmsing.*

CONTROL.

The restrictions imposed on cattle moving from infested areas in Queensland have proved very irksome to the owners. These restrictions have not prevented the fly from spreading, but they have so successfully delayed its advance that, from the economic aspect, they have been well worth while. For example, from 1930, cattle were passing through Townsville in large numbers from the infested north-west areas, after being sprayed and trucked at railheads on the north-west railway, and at no time were any flies carried through. When the Townsville district became infested in 1943 the flies came from the northern coastal areas. Once the fly reached this district its control become more difficult, for it was then in very favourable country with cattle distributed in large numbers all the way to the New South Wales border. Two spray treatments have been employed, one within the fly area, the other on its margin. Although the spread south has been much more rapid than previously, these sprays must be credited with slowing down the pest's advance.

Recent work by the Council for Scientific and Industrial Research has shown that very good control on infested properties can be obtained by the use of D.D.T. and also by trapping.

The Use of D.D.T.

D.D.T. will kill most species of insects when they come into contact with it. When applied to cattle it does not keep buffalo flies from alighting on the animals and attempting to feed, but once they have come into contact with hair or skin sprayed with D.D.T. the flies are killed. It persists extraordinarily well and animals which have been treated may remain free from flies for periods which may extend up to two to three weeks.

D.D.T. is particularly useful against insects which move about on an animal's body. In such cases, good results have been obtained by treating only certain areas of the body, for sooner or later the insects move to this area and come into contact with the poison. The buffalo fly has these habits and it is necessary to spray only those parts of the body which are specially favoured by the flies, such as the shoulders and withers. A further saving in the cost of spraying can be made by taking advantage of the habit of the fly of moving from beast to beast, and it has been found that excellent control can be secured from treatment of only half the herd.

D.D.T. may be applied either as a watery emulsion or suspension, or as a solution in oil. When used as an emulsion or oily solution, the recommendation is that the spray applied to cattle should contain 4 per cent. D.D.T.

Emulsions.

There are several emulsions on the market, all of which carry instructions for breaking down to the recommended strength of 4 per cent. Emulsions, when applied at the rate of 1 gallon of 4 per cent. D.D.T. per 80 head, give good protection, which in cases of heavy infestation may be expected to last about two to three weeks. These may be applied by means of a powerful hand continuous atomiser. It is necessary to treat only the shoulder and withers, and these parts of the body should be saturated with the spray.

Where large numbers of cattle are to be treated, the use of a hand continuous atomiser may become laborious. The knapsack spray is much easier to use, but can be very wasteful. Much of this waste however, can be avoided. Knapsack sprays are issued with a pair of large aperture nozzles and a pair of small aperture nozzles. Use the smaller nozzles, keeping the pressure in the pump well up and direct the spray on to the animals, holding the nozzle about 18 inches away.

Household sprays such as used for spraying for flies and mosquitoes in houses are useless where saturation is required, as they give too fine a spray.

Solutions.

D.D.T. is not soluble in water, but can be brought into solution in several other liquids, including fluids such as kerosene and petrol. One of the best and cheapest solvents to use is power kerosene. A 4 per cent. solution of D.D.T. can be obtained by dissolving 1 lb. of D.D.T. in sufficient power kerosene to make 2½ gallons of spray.

Oils like power kerosene have a very irritating action on the skin when applied too liberally or too frequently. This oil solution of D.D.T. should be delivered therefore as a fine mist, sufficient only to wet the hair. Protection against the fly given by this solution is less than that obtained from emulsions, but this is to be expected as a much smaller quantity of D.D.T. is sprayed on to the animals.

The safest and cheapest way of delivering this solution is by means of a household atomiser; for example, a Flit gun. A few puffs to each area of the body to be treated is sufficient. When used at this rate 2 pints will protect a herd of cows for more than one month.

Suspensions.

In this type of preparation, particles of D.D.T. are held in suspension in water. With one particular commercial "water soluble" preparation at a dilution containing 2 per cent. D.D.T., results against buffalo fly comparable with those obtained with emulsions were secured in experimental work carried out by the Council for Scientific and Industrial Research.

Protection of Dairy Cattle.

These are most conveniently treated in the bails. The first treatment should include all animals, but thereafter control can be maintained by treating only the proportion of the herd harbouring the most flies. Dry dairy cattle are best handled in the manner advised for beef cattle.

Protection of Beef Cattle.

Both beef cattle and dry dairy cattle can be treated in the crush after passing through the arsenical dip used for routine dipping for cattle tick. A 4 per cent. D.D.T. emulsion or 2 per cent. "water soluble" commercial suspension should be used, as these give the longest protection against the flies, and this is very desirable with cattle which are not handled very often. The suspension or emulsion is applied with a hand continuous atomiser or a knapsack spray in the manner already described.

Undoubtedly, a dip charged with D.D.T. would be the best to use, for this would kill all ticks and protect against buffalo fly at the same time. The practical use of such a dip depends on the stability of D.D.T. preparations and their cost. Emulsions are unstable and at present very costly, and the suspension type of preparation is more promising. In trials carried out by the Council for Scientific and Industrial

Research, dips charged with this suspension containing 0·5 per cent. D.D.T. have given a little more than 14 days' protection against the fly. Furthermore, these tests have shown that the suspension will remain reasonably stable in the dip.

Warning.

D.D.T. is a poison and must be handled with care. When used in the dairy shed every consideration must be given to prevent it getting into the milk. The milk buckets should be removed when spraying is in progress. Contamination of the udders should be avoided and the hands should be washed after using the spray. Heavy contamination of the human skin with emulsions or oily solutions may be dangerous, and due precaution should be taken to prevent this.

Trapping.

Trapping when used in conjunction with D.D.T. spraying gives excellent control. Even in the absence of spraying, trapping may be expected to bring about a considerable reduction in the numbers of the pest. Details of the trap recommended by the Council for Scientific and Industrial Research may be had on application to the Department of Agriculture and Stock, Brisbane. Briefly, this method of control comprises:—

(1) The erection of traps through which the cattle are trained to walk. These traps are wooden structures, with glassed-in sides and roof. A number of canvas strips hang from the roof inside the trap. As the cattle walk through the flies are removed by the canvas strips as they brush against the body. The flies when removed from the animal fly to the glass on the sides and roof. This glass is treated with D.D.T. and contact with this kills the flies. The D.D.T. on the glass will last for several months.

(2) The trap must be used at least twice daily. This can be assured by building it into the fence of the milking yard so that cattle pass through it on the way to the milking shed.

(3) With a little patience, there is no difficulty in getting the cattle accustomed to the trap. This is done by passing them through it for several days before the canvas screens are hung. Then, by adding the curtains gradually, the cattle can be accustomed to forcing their way through. The practicability of these traps is shown by the fact that after this training cattle realise the association between walking through the trap and freedom from the fly and will walk through of their own accord.

The traps so far have been adopted mainly for the protection of dairy cattle. They should be capable of use for beef cattle also, as they are in the United States. Any beef cattle owner who wishes to try them could erect one or two traps in a fence shutting in a regular watering place. The cattle would have to be watched very carefully until they have become accustomed to the traps (see (3) above).

Dr. Eugen Hirschfeld.

AN APPRECIATION.

A LINK with the earlier medical and scientific life of Queensland was severed by the death on his property at By'bera, Darling Downs, on the 18th June, 1946, of Dr. E. Hirschfeld. To readers of the *Queensland Agricultural Journal* and to farmers and pastoralists generally the name of Dr. Hirschfeld is familiar for his work in pastoral research, the results of some of which were published in the pages of this Journal.[1] He had often addressed members of the Royal Society of Queensland, the Royal Geographical Society of Australia and members of Parliament on his pet subject—pasture improvement.[2] Soon after taking up Bybera in 1929, he started making a collection of the grasses and fodder herbs of the property and had them neatly mounted in a large volume which he always jokingly referred to as the "Herbarium Byberense," a sly dig perhaps at the botanists' weakness for technical words.

Plate 45.

The Late Dr. E. Hirschfeld.

He had a very simple and lucid way of writing and took great pains over the preparation of his articles. If he used a long word, he used to look at it and say to himself, naming perhaps a labourer known to him, "Now, could so and so understand that?" If he could not satisfy himself on that point, he did not rest until he found a shorter word or was able to rewrite the sentence in a simpler form.

He had a particular fondness for the brigalow and belah country, looking on it, if properly handled, as one of our greatest assets. In an article in this Journal for April, 1938, he claimed that no country could compare with cleared brigalow country in its drought-resisting capacity, due primarily to the peculiar colloidal subsoil holding moisture for an exceptionally long time. He was a great advocate of poisoning brigalow as opposed to mere ringbarking, also in waiting some years before burning off, as fire is the chief cause of suckering.

He lost no opportunity in preaching the use of licks rich in phosphates to counteract the lack of phosphorus in many of our soils, and was a strong advocate of the use of a lick originally manufactured under the direction of Dr. Montgomery White, the present Agricultural Chemist. Phosphorus is, as he pointed out in an article in the *Queensland Agricultural Journal* for September, 1940, associated both in plants and animals with the process of reproduction. It follows that keeping up the phosphatic balance means an increased lambing and calving. As a source of vitamins where other vegetables were hard to obtain, he was a keen advocate of the use of native plants, such as pigweed, warrigal cabbage, saltbush, and bluebush. An account of the native plants that can be used as vegetables, mostly as spinach substances, appeared from his pen in the *Queensland Agricultural Journal* for March, 1939.

Apart from all the foregoing the late Dr. Hirschfeld was, of course, well known and highly respected in his own profession. He was born near Breslau (Germany) on the 22nd January, 1866. He graduated from Strasburg University in 1887, and took his M.D. degree in 1889. He was a pupil of some well known figures in German science of the last century—Virchow, Koch, Cohnheim and Hoppe-Seyler. He arrived in Australia in 1893, and was admitted M.D. *ad eundum gradum* by the University of Queensland in 1911, and served on the Senate of the University from 1910-1914; and also as a member of the Legislative Council in the Parliament of Queensland. He wrote many papers on various aspects of preventive medicine, in particular tuberculosis, and a classic description of dengue fever.

He had a ready wit. On one occasion soon after a visit with him to Bybera, we met the editor of the local paper, who said, "I suppose you are a regular pair of bush-whackers now." "White," said the old doctor, "he has just paid us a *very* great compliment." He had a great love of the land and for the people of the land, and was never happier than when, during brief respites from the demands of a large medical practice, he was riding among the stock in the Bybera paddocks or working on his pasture experiment plots or recording the practical results of his soil and pasture studies.

Dr. Hirschfeld was a colourful personality of great gifts and strength of character. World travelled, he spoke several languages fluently and was an authority on classical literature, quoting often from original Greek and Latin works. To those privileged to enjoy his friendship he was a good companion and a remarkably interesting conversationalist with an extraordinary range of human interest, an unusually wide knowledge of men and affairs, and an all-embracing charity. His passing certainly leaves a blank in the professional, cultural and social life of the State.

—C.T.W.

---

[1] *Some Pasture Problems of Western Queensland.* (Aug., 1936.)
Soil Problems in Brigalow and Belah Country. (June, 1937.)
Concerning the Brigalow. (April, 1938.)
Australian Native Vegetables. (March, 1939.)
The Phosphorus Problem in Western Queensland. (Sept., 1940.)

[2] *Our Western Pastures.* (Paper, Royal Geographical Society of Australia (Q), 27th Oct., 1942.)

Queensland Pastures, Their Development and Improvement. (An address to Members of the Queensland Cabinet and of the Legislative Assembly and Senior Government Officers, Brisbane, 31st Jan., 1945.)

GENERAL NOTES

Shortage of Poultry Feeds.

A serious position faced the poultry industry as a result of the acute shortage of poultry feeds, said the Minister for Agriculture and Stock (Mr. H. H. Collins) recently. He stated that he had discussed the problem with members of representative bodies within the industry and decided to make a survey of flocks and the feed position generally. This survey is now completed and reveals that there has been little, if any, reduction in poultry flocks during the last twelve months. The survey of the feed position indicated that the present wheat supply will be approximately five-sevenths of that for the corresponding period of last year. In addition, there is no barley or sorghum available, and the volume of maize production is not yet known, but the prospects are that it will be less than last year. Oats, if available, must be transported from South Australia, and shipping problems are at present holding up supplies. Bran and pollard supplies to the principal mash mixers are also in short supply.

With the resumption of killing at the meatworks, there should be fair supplies of meat, but it is doubtful whether all requirements could be satisfied. Because of the lack of winter rains there will be few, if any, early grain crops.

On an aggregate, said the Minister, there will be only forty per cent. of food available for the July to December period of this year in comparison with the corresponding period of last year.

In summing up the position, Mr. Collins stated that there will definitely not be enough feed to maintain present poultry flocks at existing levels, and he urged all poultry raisers, for their own protection, to reduce their food requirements by rigorous culling of their flocks.

Every effort has been and is being made to obtain feeding grains and mill offals from southern States; however, it may be found impossible, on the present outlook, to obtain the necessary supplies.

Relief for Dairy Farmers.

The Minister for Agriculture and Stock (Hon. H. H. Collins) has announced that the Government had decided to relieve dairymen of their obligation in regard to the amounts still outstanding on account of assistance extended to them during the 1936 drought period. This assistance was granted in order to minimise stock losses resulting from the shortage of feed and to keep up production as far as possible under the conditions prevailing at the time.

The Government has now decided to relieve dairymen of the obligation for payment of approximately £8,600.

Dairy associations and factory managements who carried out the work of distributing the assistance and collecting repayments are entitled to the thanks of both the Government and the dairy farmers concerned, Mr. Collins added.

For Frosted Pineapples.

The Minister for Agriculture and Stock (Mr. H. H. Collins) has announced that a quantity of sulphate of ammonia will be made available to pineapple growers whose crops have suffered frost damage in the coastal area south of Isis Junction. Application forms for this purpose are available at licensed fertilizer dealers and from officers of the Department of Agriculture and Stock. The last day for lodgment of applications is 31st August, and applications received after the closing date will not receive consideration.

East Moreton Stallion Board.

For the purpose of the examination of stallions at the Royal National Exhibition, the East Moreton Stallion Board has been constituted in pursuance of the provisions of "*The Stallions Registration Acts*, 1923 *to* 1940." The members are:—Messrs. A. F. S. Ohman, M.V.Sc. (Divisional Veterinary Officer, Department of Agriculture and Stock), chairman; D. Jackson (Teneriffe); and T. MacDonald (Wooloowin).

Rural Topics

Record Price for a Beef Bull.

Years ago a team of A.I.F. Diggers interested in British stockbreeding was doing the rounds of agricultural shows in the Old Country. At the Highland Show at Edinburgh that year they saw one of the finest parades of beef cattle they had ever seen in any show ring. One particular beast filled the eye as a perfect type of Hereford, a bull, Edgcote Hero by name, with straight-edge top and under line, built close to the ground, and all beef right down to the hoof, and which had just been sold to an Argentine buyer for 10,000 guineas. Not long before they had been on a stock farm outside Inverness, in the north of Scotland, where they had seen one year's crop of bull calves—only 15 in all—which had been sold to another Argentine buyer for 2,000 guineas a head—or 30,000 guineas for the lot. Many similar cases of top grade beef breeders and big prices had come within their experiences on that Scottish tour and they all, naturally, left a deep impression on the minds of those Australian stockmen—an impression not only of science, skill and brains in breeding, and of spectacular rewards, but of the enterprise of Argentine cattlemen, Australia's competitors in the British meat market.

A reader has kindly brought under notice a recent copy of "The Scotsman," the great Edinburgh daily newspaper, containing a report of the previous day's dealings at this year's Perth (Scotland) bull sale, at which the reserved junior champion Shorthorn bull brought no less than 14,000 guineas. That revived a memory of the 10,000 guinea bally bull already mentioned parading round the ring at Edinburgh and which seemed something in quality and sale value near the ultimate of a cattleman's dream; but 14,000 guineas walking on four legs in a saleyard is certainly something worth talking about. Even that price was not the record for the last Perth bull sale, for a new world record for a Shorthorn had been set the day before when 14,500 guineas was paid for a half brother of the 14,000 guinea bull. Herd averages at the sale also were spectacular, ranging up to 7,500 guineas. In the saleyard many Shorthorn cattle families, famous the world over, were represented. And here is a significant point: American and Argentine buyers were very active at the sale, running the bidding up to the big figures.

Such a record of high quality stock and spectacular purchases is obviously a reminder that the whole future of the Australian cattle industry depends on quality. That is why the parade of stud stock in any show ring, and especially at the Brisbane Exhibition, is always a satisfying sight.

Although present world requirements of meat far exceed the available supply, and for some years at least there will, perhaps, be no difficulty in selling our exportable surplus, it is necessary to take the long view and plan to meet the keener competition on our export markets which will surely develop as normal times return. American and Argentinian cattle breeders are obviously awake and are among the keenest buyers at the bull sales in the Old Country, which, as everyone knows, is the stud stock farm of the world.

Grazing is necessarily a long-range business, and success depends on the soundness of the herd foundation and the quality of replacement stock. That is why the show ring is so important, for in the arena can be seen how sound breeding principles work out in practice, how stock can be improved by selection, breeding and feeding, and how essential science is to animal husbandry.

The fact that Australia's competitors, notably those of the Argentine, have never slackened in their demand for the best of stud beef bulls has to be fully appreciated. It seems certain that importations of stud stock to Australia as an infusion of new blood will be delayed until the shipping position has improved. Australian cattle breeders have, however, maintained high stock standards, in spite of wartime difficulties, as is evident at show parades and at recent stud stock sales.

On the prospects of our beef trade generally, the domestic demand must expand as our population increases. Then there is the possibility of market expansion in the countries north of this continent where changing habits and, perhaps, increasing purchasing power, may strengthen the demand for our pastoral products.

Still, as a Scotsman would say, that 14,000 guineas walking on four legs in the Perth bull ring must have been a grand sight.

AN EDUCATIONAL FILM LIBRARY.

The Shell Educational Film Library established in 1940 was the first free sound film library to be instituted in Australia, and now has comprehensive branch film libraries in four capital cities. The Brisbane Branch Library was opened on 1st August. The library is open to any operator of a 16 m.m. sound projector, provided the equipment is not used for personal gain. It consists of six copies of each of more than 120 subjects of great variety and excellent quality, ranging from strictly technical subjects, which during the war were used widely by Army and Air Force and educational institutions for instructional purposes, to documentary and general interest subjects of high educational and entertainment value.

More than a quarter of a million feet of 16 m.m. sound film is distributed every month to hundreds of borrowers in every corner of the Commonwealth. The service is entirely free, the sole obligation of the borrower being payment of return freight on film packages. Shell pays the outward freight and all other charges in connection with the administration, upkeep and operation of the highly organised system necessary to ensure the smooth operation of such a big output of film.

Plate 46.

PROCESSING THE SHELL 16 M.M. TECHNICOLOUR FILM, "LONDON VICTORY MARCH."

Typical of these productions is the latest addition to the library, a technicolour film of "London Victory March." Of special interest in this short is the march past of the Australian Victory Contingent. This film was taken in London and processed in Australia.

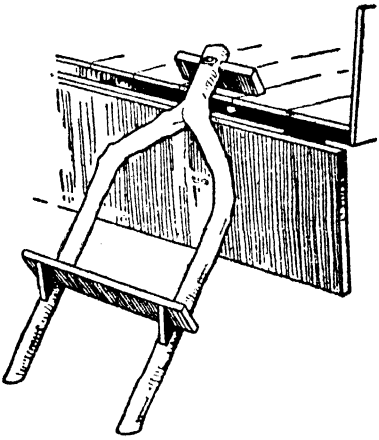
Another outstanding film is "The Mosquito," a documentary film depicting the life history of the mosquito and the malaria parasite, together with control measures used in Eastern countries as well as in Australia. The Australian section of this film was produced with the co-operation of the Health Department of the Brisbane City Council as well as the Army and Medical Authorities in Queensland.

This film is still being used for the education of children attending primary schools in the metropolitan area, and also extensively in country centres for the education of school children.

Other outstanding films include "Under Western Skies" and "Permanent Agriculture," in which causes of soil erosion are strikingly pictured. This month, both these films have already attracted appreciative audiences in Darling Downs centres. This form of visual education is intensely practical and the Shell Film Unit is to be commended for setting an excellent example in national service.

GADGETS AND WRINKLES

A BAG LIFTER FROM BUSH TIMBER.



This is quite a good home-made bag lifter, the fork being 1 ft. longer than the height of the cart.

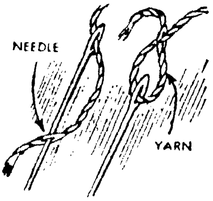
A cross-piece is bolted across the single end.

In use, this rests on the tail of the cart and stops the wobble when the fork is lifted.

Across the opposite side of the form (22 in. from the ground) is a 4 inch wide platform, or step bolted to each leg by a long bolt.

Rest the crosspiece against the back of the cart, then upend a bag of super against the step; then lift its lower end. Heave the bag on to the step, then upend the fork, bag and all, and dump the bag on the cart. It calls for much less effort than a straight-out lift of 3 ft. 6 ins. does.

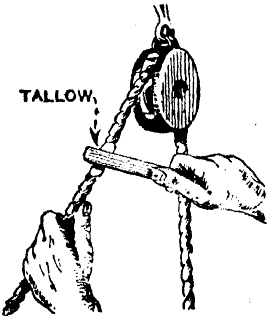
KEEPING YARN IN THE EYE OF A NEEDLE.



The annoyance of having yarn or twine pull from the eye of a needle and so cause frequent rethreading may be avoided by first pulling the yarn through the eye and then spreading the strands near the end that was pulled through and then inserting the needle as shown.

This will make a smooth tie without a knot and its use will be found very convenient on many occasions. It also helps to avoid losing quite a number of needles.

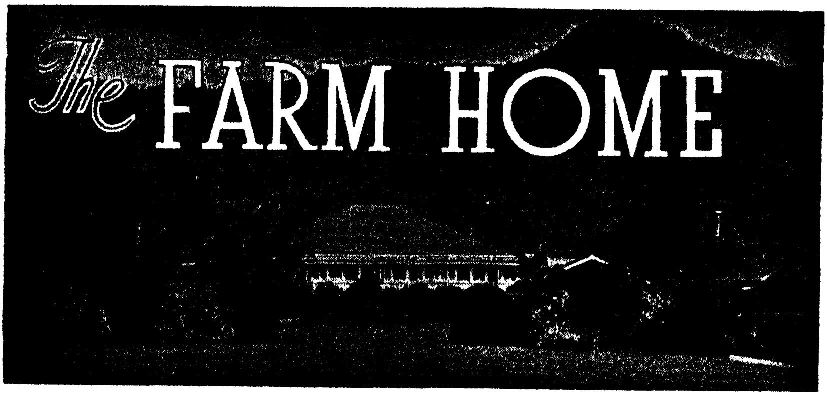
TALLOW SLOWS UP ROPE WEAR.



This is a very useful idea to obtain the maximum wear from rope. Tallow rubbed into any manila, cotton or linen rope at points which get the greatest wear will do wonders towards lengthening the life of the rope as well as making it easier to handle, especially in wet weather.

Genuine mutton or sheep's tallow is best and will not tend to rot the fibres.

The items on this page have been extracted from "Handy Farm and Home Devices and How to Make Them," a recent notable work by J. V. Bartlett, published in Adelaide on behalf of the War Blinded Association. Arrangements are in train for early distribution of this very useful book in Queensland.



Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

BEFORE BABY IS BORN.

QUEENSLAND has reason to be very proud this year, because a new record has been established, and a more important record than any in the worlds of trade or sport, and that is the lowest infant death rate and the lowest maternal death rate in the history of this State.

When the first Maternal and Child Welfare Centres were opened, approximately 59 babies and 3 mothers died for every one thousand babies born. Last year, the number was reduced to just over 29 babies and 2 mothers, which means a saving of the lives of almost 800 babies and 27 mothers for the year.

"How has this been achieved?" it may be asked. The reply is:—"By improving the care and supervision available to the mother before baby is born, by encouraging every mother to feed her own baby, and by making available in our welfare centres regular trained supervision of baby's health, feeding and management from the time his mother leaves hospital."

However, although this reduced death rate is the lowest on record, it is not yet good enough. We realise that still far too many babies die in the first month of life, and we feel that *every* mother should be able to go through her confinement safely and be healthy afterwards, and we know that this is all part of one problem. We can only save these new-born babies by saving their mothers—if we save the mothers, they will save the new-born.

The key to our problem then is the period *before* baby is born, known as the ante-natal or pre-natal period. The deaths of mothers in child-birth and of very young infants can not be reduced merely by providing hospitals and medical and nursing care for the time when baby is born. What must be done is to make sure that every expectant mother has specialised care for the whole 9 months of her pregnancy. To achieve this, we must have the co-operation of every prospective mother, and every prospective father too, because a father can do a great deal to encourage his wife to obtain the help and advice available for her at these times.

In Queensland we are fortunate in that ante-natal care is in fact available for every mother. If she intends to have her own family doctor to look after her when her baby is born, she should visit him as soon as she knows she is pregnant, and he will be pleased to arrange for her to call regularly for supervision right up to her confinement. If, however, the mother intends to have her baby in a public hospital, she should arrange to attend the ante-natal clinic attached to that hospital during her pregnancy.

The Government, through its Maternal and Child Welfare Service, has established free ante-natal clinics in both North and South Brisbane, so that mothers who are unable to travel to the hospital regularly, or who are having a nurse only to look after them when baby is born, may arrange with the sisters at their nearest Maternal and Child Welfare Centre to have medical supervision at one of these clinics.

Country mothers who cannot attend either doctor or hospital regularly can enrol with the Ante-natal Correspondence Service at 184 St. Paul's Terrace, Brisbane, and receive a monthly letter of helpful advice related to this particular period of pregnancy, and also a booklet called *The Expectant Mother*.

The sisters at any Maternal and Child Welfare Centre, who are general, obstetric and child welfare-trained nurses, are always willing to supply patterns of baby clothes, and advice on these and any other personal problems. Next month, we shall consider the special points of ante-natal care.

Further advice on this and other matters can be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau, 184 St. Paul's Terrace, Brisbane*, or by addressing letters, *Baby Clinic, Brisbane*. These letters need not be stamped.

IN THE FARM KITCHEN.

Eggless Sponge Pudding.

Two cups plain flour, 1 teaspoon ground ginger (if liked), 1 cup golden syrup, ¼ cup butter, ¾ cup hot water, 1 teaspoon bicarbonate soda. Sift flour and ginger into a basin and add the golden syrup. Put butter into a cup and fill cup with hot water. When butter has melted add soda, and when soda has dissolved mix into the flour, &c. Mix thoroughly, put into a buttered basin, and steam two hours. Serve with sweet sauce.

Roly-poly Pudding.

Three ounces grated suet, ½ lb. flour, a pinch of salt, ¼ teaspoon of baking powder, cold water, 4 oz. jam. Add to the suet the flour, salt and baking powder. Mix well and make into a firm paste with water. Roll out ¼ inch thick. Wet the edges all round, and spread the paste with jam. Roll it up into the shape of a bolster, and press the edges together securely. Put the pudding into a floured cloth and tie both ends. Have ready a pan of boiling water, put it in without bending it, and boil quickly for two hours.

Apple Pie.

Peel and core some juicy apples and slice them. Butter a fireproof dish and put in a layer of apples and then a layer of chopped candied peel, some cleaned currants and a little mixed spice. Put the melted butter over this and continue with layers of apple and candied peel and currants. Over the top add a cup of sugar and a cup of hot water and cover the pie with pastry. Bake in a hot oven.

Rhubarb Pie.

Hot water pastry: Six ounces flour, 2 oz. lard or suet, ½ teaspoon salt, ½ gill milk, water, or a mixture, Filling: ½ lb. rhubarb, 1½ oz. sugar, water. Sieve flour and salt. Put fat and milk or water in a pan—bring to boiling point. Pour into centre of flour. Beat and mix with wooden spoon until a pliable consistency. Shape pastry into a cup—place fruit and sugar into cup. Cover with pastry—mark edges. Bake in a hot oven 40-45 minutes. Serve hot or cold.

Golden Syrup Pudding.

Mix 2 tablespoons cornflour, 2 tablespoons sugar, and 2 eggs to a paste. Then add 2 heaped tablespoons golden syrup. Pour two pints boiling milk on to the mixture. Stir into a smooth mixture and bake for 15 minutes.

Honey Lemon Pie.

Take 1 cup of honey, 3 egg yolks beaten lightly, 1 tablespoon flour, juice and freshly-grated rind of 1 lemon, 1 tablespoon melted butter. Mix thoroughly in order given, then add 1½ cups milk. Line pie plate with pastry, bake golden brown, pour in lemon and honey mixture and bake till set. Cover with meringue made with egg white beaten with 3 tablespoons honey and a few drops of lemon juice and browned lightly.

QUEENSLAND WEATHER IN JULY.

There were a few showers in a restricted area along the North Coast Barron and Peninsula which brought aggregate district rainfall totals to 18 per cent. below and 5 per cent. above normal respectively, otherwise over the greater part of the State it was rainless. Deficiencies ranged from 83 per cent. to 100 per cent. below average, including 11 districts in the 95 to 100 per cent. category. July makes the third exceptionally dry and mainly rainless month in succession, and the aggregate average figures for May, June and July incorporated below in the District Rainfall Table indicate in most cases a record three months dry spell. General pastoral and agricultural prospects have steadily deteriorated and the lack of surface water is acute in many places. Badly spaced or poor inland rain distribution during 1945 (and for three previous years in the Southern Interior) was partially offset by useful monsoonal falls in January. Improved conditions, at that time, were not consolidated for winter carrying, as normal summer rains failed and conditions have steadily deteriorated. Early and abundant general rain is required during August and September, normally low rainfall months, to revive all pastures and replenish surface water. Up till the end of March and early April tropical coast and adjacent highland areas, parts of the Downs and Moreton Divisions had received abundant to flood fall totals, but since then the few isolated showers have been valueless to agricultural and dairying industries. Most of the Port Curtis and adjacent highland areas missed the summer flood rains and received a poor distribution in 1945. From the Maranoa to the Central and South Coast early relief is urgent. With no rain during the critical cultivation and sowing period practically no wheat could be successfully sown and in central and southern cane areas cold to frosty night conditions have contributed added adverse effects.

Pressure.—Abnormal activity was maintained in the southern low pressure belt but none of the rapidly moving centres penetrated far enough inland to have any normal winter season rain producing influences in Southern Border districts, though at times moderate westerly winds in those districts, accompanied the movement of the more vigorous southern low centres and spread dust and smoke haze over most of the State. The stability of the prevailing continental "high" over inland Australia was practically unbroken, with resultant cloudless conditions, persistent frosts and maximum hours of sunshine.

Temperatures.—Consistent moderate maximum readings accompanied the cloudless conditions and averages were well above normal, ranging from 0.9 deg. above at Georgetown and 1.2 deg. at Palmerville to several over 3 deg., 3.7 deg. at Stanthorpe and 5.0 deg. at Thargomindah. Minimum temperatures were much below normal, most 3 to 4 deg., and ranged from 0.5 deg. below at Longreach to 8.9 deg. at Rockhampton, 6.2 deg. at Mitchell and 7.2 deg. at Stanthorpe.

The excessive frost periods of previous months were continued. Herberton reported 30 deg. on the grass (19th), while Mitchell recorded 24 frosts, lowest terrestrial reading 15 deg. (6th); Tambo 22, lowest 19 deg. (3 nights); Stanthorpe 27, lowest terrestrial 7 deg. (16th).

Bush Fires.—With the prevailing record dry spell many small fires of the local type were reported in the south-east districts and along the coastal areas. A much more critical period, however, will follow with normally rising temperatures and the possibility of stronger north-west to west wind days during August and September, unless soaking rain falls at an early date. The following table sets out the record low relative humidity figures for Brisbane during June and July:—

	Per cent. 9 a.m.	Per cent. 3 p.m.	Per cent 9 p.m.
June	54	37	56
(Normal)	73	54	73
July	53	26	51
(Normal)	72	51	72

Brisbane.—Pressure $\frac{9+3}{2}$ 30.025 inches (normal 30.080 inches). *Temperatures.*—Mean maximum 71.9 deg. (normal 68.5 deg.), record highest (previous 71.8 deg., 1917). Mean minimum 46.2 deg. (normal 48.8 deg.), lowest since 45.2 deg. in 1929. Mean temperature 59.5 deg. (normal 58.6 deg.). Highest daily 84.3 deg. (23rd) record. Lowest daily 38.3 deg. (20th). *Rainfall*, 19 points (average 218 points). Record 3 months dry spell (May to July) 68 points recorded (average 770), (123 in 1917) and 210 in 1940). *Sunshine*, 286.8 hours (9.3 daily), record highest, 87 per cent. of possible number of hours.

The rainfall position is summarised below:—

Division.	Normal Mean.	Mean 1946.	Departure from Normal.	Total May, June, and July.	Averag May, Jun and July
	Points.	Points.	Per cent.	Points.	Points.
Peninsula North	42	44	5 above	181	237
Peninsula South	24	Nil	100 below	11	119
Lower Carpentaria ..	20	Nil	100 ,,	3	109
Upper Carpentaria ..	42	Nil	100 ,,	1	256
North Coast Barron ..	114	93	18 ,,	377	619
North Coast Herbert ..	179	31	83 ,,	300	898
Central Coast East ..	111	5	95 ,,	68	473
Central Coast West ..	65	10	85 ,,	13	276
Central Highlands ..	116	2	98 ,,	16	402
Central Lowlands ..	82	Nil	100 ,,	15	286
Upper Western	41	Nil	100 ,,	1	159
Lower Western	51	Nil	100 ,,	Nil	193
South Coast Port Curtis ..	178	22	87 ,,	30	632
South Coast Moreton ..	227	27	88 ,,	102	873
Darling Downs East ..	181	21	88 ,,	69	520
Darling Downs West ..	141	11	92 ,,	25	443
Maranoa	147	2	99 ,,	13	442
Warrego	107	2	98 ,,	19	353
Far South-west	69	Nil	100 ,,	19	267

Commonwealth Meteorological reau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

SEPTEMBER.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	6.03	5.33	Cairns	26	32	Longreach	34	36
6	5.58	5.36	Charleville	27	27	Quilpie	35	35
11	5.52	5.38	Cloncurry	48	52	Rockhampton ..	9	11
16	5.46	5.40	Cunnamulla ..	29	29	Roma	17	17
21	5.40	5.42	Dirranbandi ..	19	19	Townsville	22	27
26	5.35	5.45	Emerald	18	20	Winton	38	42
31	5.30	5.46	Hughenden ..	33	27	Warwick	4	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.

Date.	Rise.	Set.
	a.m.	p.m.
1	9.16	10.38
2	9.50	11.27
3	10.26	..
		a.m.
4	11.06	12.21
5	11.50	1.15
	p.m	
6	12.38	2.09
7	1.31	2.59
8	2.28	3.47
9	3.27	4.32
10	4.27	5.13
11	5.28	5.51
12	6.29	6.27
13	7.30	7.02
14	8.33	7.38
15	9.37	8.15
16	10.43	8.55
17	11.49	9.40
18	..	10.31
	a.m.	
19	12.54	11.27
		p.m.
20	1.56	12.28
21	2.52	1.31
22	3.41	2.35
23	4.25	3.38
24	5.03	4.38
25	5.38	5.36
26	6.10	6.32
27	6.43	7.28
28	7.14	8.22
29	7.47	9.27
30	8.22	10.12

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	24	14	40	29	15	4	46	32
6	29	10	45	25	20	0	52	28
11	23	14	39	30	14	5	45	34
16	13	25	28	41	2	16	31	48
21	11	28	26	43	0	19	28	52
26	19	19	35	34	10	10	39	39
31	26	12	42	27	17	2	49	30

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	40	15	57	41	42	26	38	15
3	48	11	63	38	47	24	39	12
5	52	5	66	34	50	20	43	7
7	52	4	66	34	50	20	43	6
9	48	8	63	36	47	22	39	9
11	38	17	56	43	41	27	32	17
13	27	28	49	49	33	34	23	24
15	15	39	41	57	26	42	15	33
17	7	48	36	62	21	48	8	40
19	5	52	35	65	20	50	6	44
21	9	50	37	63	22	49	9	42
23	13	42	39	59	24	44	13	36
25	22	33	46	53	30	38	20	28
27	33	22	53	45	38	30	28	20
29	40	9	61	37	46	23	37	10

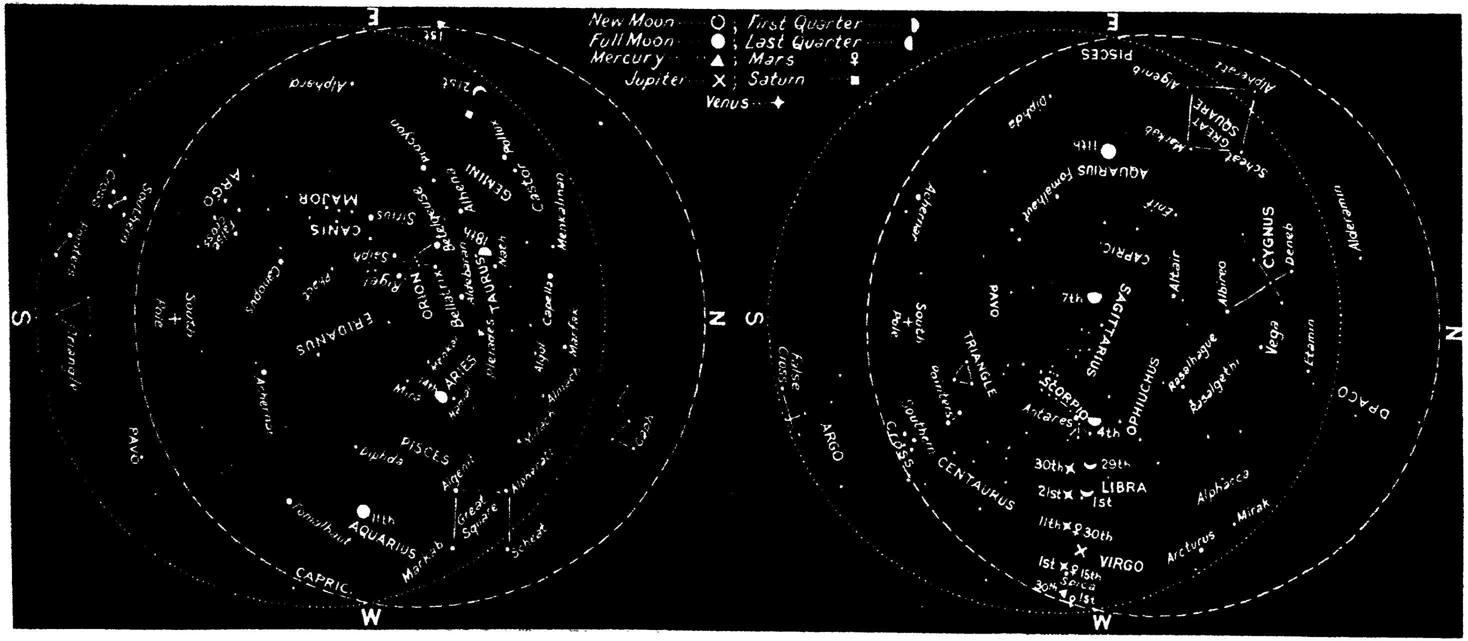
Phases of the Moon.—First Quarter, September 4th, 12.49 a.m.; Full Moon, September 11th, 7.59 p.m.; Last Quarter, September 18th, 4.44 p.m.; New Moon, September 25th, 6.45 p.m.

The Spring Equinox of the Southern Hemisphere will be September 24th. On this day the sun will rise and set at true east and true west respectively. On September 13th and 26th the moon will rise and set at true east and true west respectively.

Mercury.—At the beginning of the month, will be west of the sun, rising about half an hour before sunrise. On the 14th it will be in conjunction with the sun after which it will pass to the east of the sun, setting about one hour after sunset by the end of the month.

Venus.—Will still be a brilliant object in the western evening sky and on the 4th will pass just south of that other brilliant planet, Jupiter. At the beginning of the month it will set between 9 p.m. and 10 p.m. and at the end of the month will set between 9 p.m. and 10.15 p.m., being at its greatest angle east of the sun on the 18th.

Mars.—In the constellation of Virgo, will be observable in the western sky during evening twilight. On the 25th it will pass one degree south of Jupiter, setting about 15 minutes after the planet at the end of the month.



Jupiter.—Will make interesting patterns with Venus and Mars in the western evening sky. At the beginning of the month it will set between 9 p.m. and 10 p.m. and at the end of the month between 7.30 p.m. and 8.30 p.m.

Saturn.—In the constellation of Cancer, at the beginning of the month will rise between 4.15 a.m. and 5.15 a.m. about 22 degrees north of true east. At the end of the month it will rise between 2.30 a.m. and 3.30 a.m.

Star Charts.—The chart on the right is for 7.15 p.m. in the south-east corner of Queensland to 8.15 p.m. along the Northern Territory Border on the 15th September. (For every degree of longitude we go west, line increases 4 minutes.) The chart on the left is for 9 hours later. On each chart the dashed circle is the horizon at Cape York and the dotted circle is the horizon along the New South Wales Border. When facing north hold "N" at the bottom; when facing south hold "S" at the bottom and similarly for the other directions. Only the brightest stars are included and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus, at the beginning of the month the stars will be in the positions shown about one hour later than the time stated for the 15th and at the end of the month about one hour earlier than that time. The positions of the moon and planets, which are continually changing in relation to the stars, are shown for certain marked days. When no date is marked the position is for the middle of the month.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

JULY RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of years' re-cerds.	July, 1945.	July, 1946.		July.	No. of years' re-cords.	July, 1945.	July, 1946.
North Coast.	In.		In.	In.	*South Coast—cont'd.*	In.		In.	In.
Atherton	1·12	42	2·62	0·50	Gatton College ..	1·37	44	2·03	0·26
Cairns	1·53	61	3·03	0·98	Gayndah	1·47	72	3·23	0·46
Cardwell	1·38	71	1·75	0·06	Gympie	2·07	73	2·83	0·35
Cooktown	0·98	67	0·96	1·26	Kilkivan	1·50	62	3·35	0·31
Herberton	0·89	57	1·61	0·54	Maryborough ..	1·93	72	4·38	0·09
Ingham	1·69	51	1·49	0·12	Nambour	2·67	47	4·81	0·60
Innisfail	4·75	62	6·61	1·37	Nanango	1·65	61	1·55	0·74
Mossman	1·19	19	1·94	1·01	Rockhampton ..	1·73	72	3·93	0·11
Townsville	0·67	72	0·45	0·01	Woodford	2·28	55	2·01	0·18
Central Coast.					*Darling Downs.*				
Ayr	0·73	56	2·22	Nil	Dalby..	1·71	73	1·57	0·32
Bowen	0·92	72	3·80	0·16	Emu Vale	1·57	47	2·05	0·10
Charters Towers ..	0·67	61	0·78	0·20	Jimbour	1·48	64	1·54	0·28
Mackay	1·64	72	4·68	0·10	Miles	1·62	58	1·12	0·36
Proserpine	1·58	40	4·30	0·24	Stanthorpe	2·00	70	2·48	0·35
St. Lawrence ..	1·36	72	3·72	0·07	Toowoomba	2·06	71	3·08	0·41
South Coast.					Warwick	1·80	78	1·64	0·05
Biggenden	1·41	44	3·19	0·10	*Maranoa.*				
Bundaberg	1·83	60	4·58	0·17	Roma	1·43	69	2·13	0·05
Brisbane Bureau ..	2·16	94	3·57	0·19	St. George	1·21	62	1·90	0·03
Caboolture	2·37	67	4·05	0·13					
Childers	1·70	48	2·16	0·18	*Central Highlands.*				
Crohamhurst.. ..	2·90	50	3·28	0·52	Clermont	1·06	72	2·66	Nil
Esk	1·90	56	2·17	0·30	Springsure	1·18	74	2·24	Nil

CLIMATOLOGICAL TABLE FOR JULY.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	77	61	81	24, 25, 27	51	20	98	4
Herberton	..	71	48	81	23, 24	34	19	54	3
Townsville	..	77	54	81	26	45	20	1	1
Rockhampton	30·11	76	42	87	15	31	3	11	2
Brisbane	30·08	72	46	84	23	38	20	19	2
Darling Downs.									
Dalby	..	69	34	80	22	23	6	32	3
Stanthorpe	..	61	26	72	22	16	6	35	3
Toowoomba	..	65	35	75	22	26	6, 9, 10	41	3
Mid-Interior.									
Georgetown	30·06	83	49	88	24, 26	38	20	Nil	..
Longreach	30·15	78	43	89	16	34	19	Nil	..
Mitchell	30·16	70	31	85	22	21	6	4	2
Western.									
Burketown	..	82	53	88	29	44	19	Nil	..
Boulia	30·07	76	40	89	22	32	19	Nil	..
Thargomindah	30·09	70	44	84	22	34	19	Nil	..

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

Volume 63 Part 3

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

SEPTEMBER, 1946

Issued by Direction of
THE HONOURABLE H. H. COLLINS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

PAGE.

Event and Comment—

Problems of the Dairy Industry .. 131
The British Butter Market 132

Field Crops—

Dairy Fodder Crops in East-Central Queensland 133

Vegetable Production—

Deterioration of Unlimed Vegetable Soils 142

Plant Protection—

Passion Fruit Mite 145
Protection of Stored Cowpea Seed and its Control 148
Black Rot and Black Leg of Cabbage and Cauliflower 151

Answers to Correspondents—

Ringworm Bush 150
✓ Gomphrena Weed 150
Josephinia Burr 150
Feather Top 150
Oleander is Poisonous 150

PAGE.

The Dairy Industry—

Observations on Dairy Production in New Zealand 154
Low Butter Content of Late Winter Milk 161

Animal Health—

Contagious Bovine Pleuro-Pneumonia 162
The Brisbane Exhibition 167

General Notes—

Excess Moisture in Chaff 185
Assessment on Milk in South Coast Area 185

The Farm Home—

Care of the Expectant Mother .. 186
Our Daily Bread 187
Queensland Weather in August .. 188
Rainfall in the Agricultural Districts 189
Climatological Table for August .. 189
Astronomical Data for Queensland .. 190

STATE'S SEEDS ARE GOVERNMENT TESTED

	Bushel s.	d.
BEANS—Brown Beautys ..	70	0
BEANS—Canadian Wonders	82	6
	lb.	
PUMPKINS—Beaudesert ..	5	0
PUMPKINS—Cattle ..	2	6
RAPE—Dwarf Essex ..	1	1
RAPE—Giant Kangaroo ..	1	2

ASK FOR YOUR REQUIREMENTS

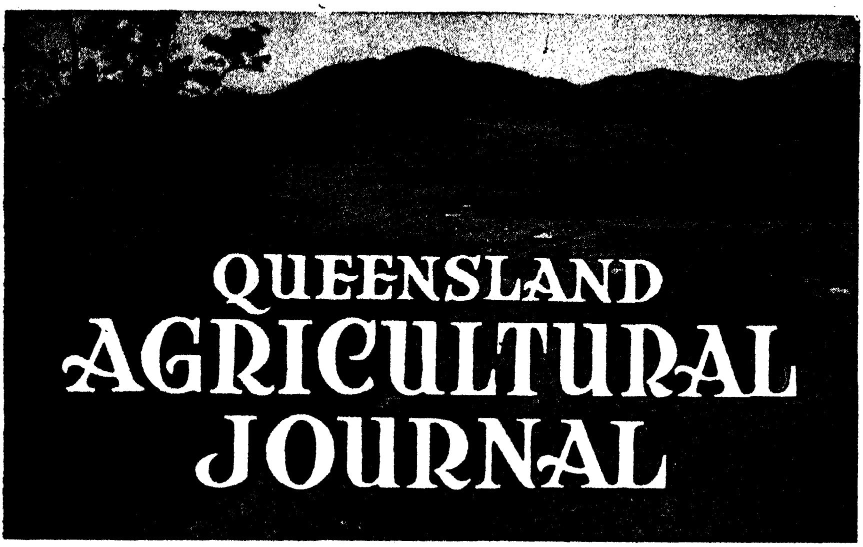
SUDAN SEED

Prime regraded, recleaned, free
Johnson Grass and other weeds

Bag Lots - - - **7d. lb.**
Small Lots - - **7½d. lb.**

State Produce Agency Pty. Ltd.
ROMA STREET **BRISBANE**

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, including postage. General Public, **Ten Shillings**, including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Volume 63 | 1 SEPTEMBER, 1946 | Part 3

Event and Comment.

Problems of the Dairy Industry.

IN the course of his address at the inaugural meeting of the State Council of the Queensland Dairymen's Organization, the Minister for Agriculture and Stock (Hon. H. H. Collins) suggested that in seeking to improve the conditions of dairy production the lead given by the sugar industry might well be followed. Facing the problem of falling markets, that industry had investigated economics on the cane farm, the possibility of increasing the yield and quality of its product and the practicability of raising its standard of milling efficiency. As a consequence, cane farmers had increased their production in 20 years by over 50 per cent. and thus had been successful in cushioning the impact of declining sugar selling values. That achievement was a challenge to dairymen to do likewise, beginning with economic factors on the farm.

It had been said that the price of butter was the factor which alone could determine the future of the dairy industry. While that was a very important factor, it had to be remembered that a butter exporting country was usually compelled to meet a competitive market for the commodity which it shipped abroad. Under the butter stabilization scheme, Commonwealth-wide in its application, the Australian consumer paid an Australian price for Australian butter which was higher than the export price of pre-war days. So the limiting factor was the price on the export market and the quantity which could be sold in Australia, plus what the Australian consumer was prepared to pay. It could readily be seen that the price of butter if higher than the family man could afford to give would not help the dairy farmer. The fact that the trade in margarine had developed immensely and was competing with butter on overseas markets should not be overlooked. As a substitute product, palatable and nutritious and largely derived from other Australian products—such as peanut oil, cottonseed oil, maize oil and animal fats—margarine would definitely remain on the competitive market.

Continuing, the Minister said that drought had to be regarded as part of normal conditions, and experiences in dairying and other districts at the present time provided an example of the enormous loss which occurred in consequence of its periodical visitation. Many other countries in the normal course of events had to provide both feed and housing for their stock for approximately one-third of every year. Surely under more genial climatic conditions it was not beyond the capacity of the dairy industry to provide against recurring dry seasons, and the Queensland Dairymen's Organisation, in co-operation with the Government, could assist in measures for offsetting drought effects. The fact that some farmers got through a protracted dry period without losing any stock showed that it could be done. Although farmers on the Darling Downs were going through a very serious drought, many had reserved stocks of hay, silage and grain to tide them over the period of seasonal severity.

One of the biggest issues in the industry was the pasture problem. Although considerable research work had been done, the problem of better pastures still remained. Soil, rainfall and climate determined what could be grown. As conditions in Queensland were so dissimilar from those of the southern States and of the colder dairying countries, in pasture research it was necessary to depend on our own resources rather than look to other States and countries for guidance.

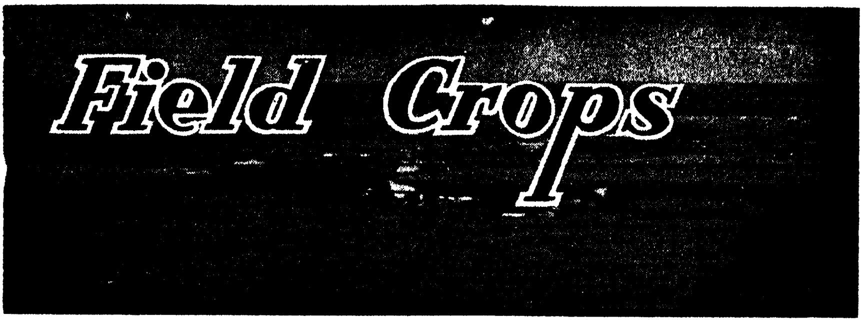
Concluding, Mr. Collins reminded his audience that the Department he had been called upon to administer existed for the benefit of every primary industry associated with agriculture and stock and invited the dairymen's organization to use its services to the fullest extent. In the Department were men of the highest technical qualifications, skilled in all branches of husbandry and able and willing to co-operate with the farmer in the solution of his problems and assist him generally in the development of his industry.

The British Butter Market.

In his last review (April, 1946) of trade and marketing conditions in the United Kingdom, the Agent-General for Queensland (Mr. L. H. Pike) states that the Ministry for Food continues to control the importation and distribution of all butter supplies, and to regulate the prices and the rationing of the commodity to the consuming public. All imported butter is still marketed under what is termed a "National" brand or grade, irrespective of country of origin. The wholesale price of butter remains at from 159s. 4d. to 166s. 4d. per cwt., the retail price being fixed at 1s. 8d. per lb.

In so far as quality, packing and condition are concerned, Queensland butter has maintained a high standard, and reports to hand also indicate that the grading has been done very efficiently. High-grade margarine is still being used to supplement the butter ration.

"It is interesting to note," the Agent-General reports, "that whereas in 1938 the United Kingdom imported 475,890 tons of butter, this figure declined to 153,200 tons in 1944, and to 190,134 tons in 1945. The average consumption of butter in the United Kingdom for the period 1934-38 was 502,000 tons; this had dropped to 185,000 tons in 1945. On the other hand, the consumption of margarine increased for the same period from 183,000 tons to 435,000 tons."



Dairy Fodder Crops in East-Central Queensland.

O. L. HASSELL, Senior Adviser in Agriculture.

PREPARATION OF LAND.

WHETHER it is intended to plant winter or summer crops, too much stress cannot be laid on the early preparation of land in the Central district, on account of the erratic rainfall. It is a quite common sight in the district to see a winter or summer crop that has germinated well wilting at some stage of its growth, because of lack of subsoil moisture to carry it through until the next fall of rain occurs. The ground should be ploughed and left in the rough, in order to trap as much moisture as possible and also to prevent erosion. Just prior to planting the ground should again be ploughed and worked to a fine tilth, so as to have a well prepared bed to receive the seed. It is no more costly to prepare the land thoroughly than to make a hurried preparation just before planting. Neglect in this way will often mean the difference between a profitable and an unprofitable crop.

SUMMER CROPS.

Lucerne.

The most valuable of all leguminous crops, lucerne once established is a very hardy plant and will do reasonably well on a variety of soils. The most suitable soils on which to grow the crop are the deep alluvials, but there are a number of other types in the district which will produce payable crops, such as the brown clay loams of the softwood scrubs in the Callide and Dawson valleys, and the red clay loams of the Caves, Milman, Rossmoya and Mt. Larcom districts. If well established on these soils, lucerne will last for at least three years under grazing conditions. On the better types of soils the crop will last for six years under proper management.

Preparation of the Land.

Much greater care and attention must be given to the preparation of land for lucerne than for most other crops. Haphazard methods just prior to planting will only lead to disappointment and failure. The land should be well ploughed in the early summer months. On the coastal belt it is advisable to plant a cover crop such as cowpea or one of the millets. When this crop has reached its maximum growth of green material, it should be ploughed in and allowed to rot, and the soil left in a rough state until nearing planting time, when it should be again ploughed and worked to a fine tilth in readiness for planting. On the drier inland areas it is preferable to bare fallow the land in order to save as much moisture as possible for the ensuing crop. Sheep or cattle may be used to keep down the weeds during the summer months and it may also be necessary to disc harrow the area several times. A final ploughing and harrowing of the land will be required before planting the seed. In order to obtain a firm seed-bed the ground should be rolled.

Planting.

The seed should be planted with the first rains in May or June. On non-irrigated areas 6 to 8 lb. seed per acre is found quite sufficient, while farmers on the irrigated areas around Rockhampton prefer to use from 10 to 15 lb. per acre. As a precaution it is advisable to inoculate the seed before planting. The inoculum with instructions as to its use can be obtained at a small charge from the Department of Agriculture and Stock, Brisbane. On small areas the seed may be sown broadcast. If this method is adopted, half the seed should be sown in one direction across the paddock and the other half at right angles across the first cast. The seed may be covered with a brush harrow or a set of light harrows turned upside down.

Handling the Crop.

The crop should be cut when the first flowers appear or when young shoots are noticed at the crown of the plant. When the crop is well established it should be harrowed after every cut to rid the field of foreign growths, such as grass and weeds. To a large extent the life of a lucerne stand will depend on how it is managed. Constant grazing of a lucerne field will shorten its life considerably.

Cowpea.

A leguminous plant and summer-growing annual, cowpea, although used mainly in Queensland as a green manure crop, is a valuable grazing and hay crop. It is an exceptionally hardy plant and will survive in a dry time when most other fodder crops fail. It should be more widely grown in the Central district, especially on areas not suited to lucerne growing, such as the drier inland areas. On areas as far west as Barcaldine good crops of cowpea have been grown. Cowpea does well on a variety of soils, provided they are well drained. As a grazing crop, stock do not care for it at first, but when forced to eat it they develop a taste for it.

Planting.

If required for hay the crop should be planted in the Central district in December or January, in order to allow the harvesting to take place after the end of the wet season. If required for grazing it may be planted with the first storms in October to November. It is very subject to frost. The seed may be planted in rows or broadcast. If planting in rows, the usual spacing is 30 to 36 inches between the rows, and from 8 to 10 lb. of seed per acre will be required. If planting broadcast, 15 lb. of seed per acre will be needed. With the smaller varieties of seed, such as Poona, a lesser amount of seed will be required. The crop takes from 4 to 4½ months to mature.

Varieties.

Poona pea is one of the most popular varieties in Queensland at the present time, on account of its hardiness and prolific growth. Clay and Black Mammoth are also used to some extent. At the present time the Department is trying out a hay type of crossbred cowpea, which if harvested at the correct stage of its growth may be cut with an ordinary mowing machine and raked with a hay rake.

Haymaking.

The cowpea crop should be cut when the pods have fully developed but before they commence to ripen. On account of the fleshy nature of the stems, the crop should be placed in small stooks after cutting and allowed to remain there until thoroughly dry before placing in a larger stack or shed. The hay is nutritious and is readily eaten by stock.

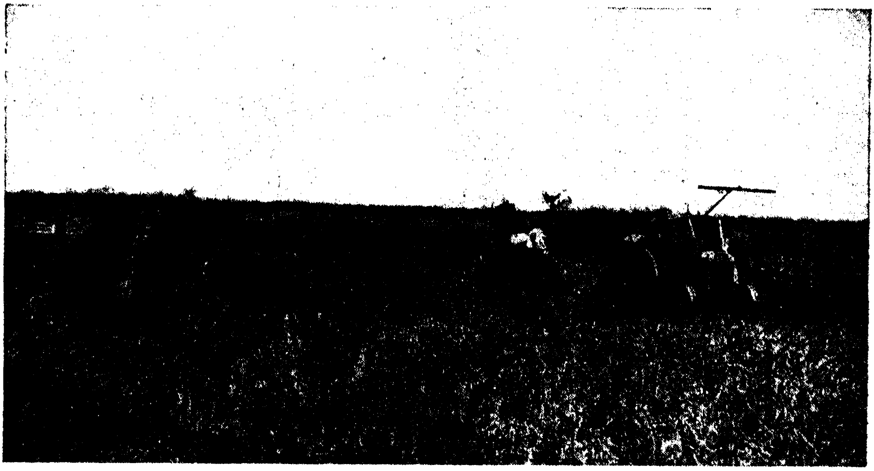


Plate 47.

HARVESTING SUDAN GRASS IN THE CENTRAL DISTRICT.

Sudan Grass.

Because of its ability to withstand long dry spells, Sudan grass is one of the most outstanding fodder crops grown in the Central district. Although the plant is an annual, crops have been known to last for two years during good seasons and mild winters. Sudan grass is mainly grown for grazing purposes, although it makes fair hay and a first class ensilage. It is most unfortunate that this valuable crop is liable to cause prussic acid poisoning during certain periods of its growth. After it has reached the flowering stage and when it has been made into hay it is generally considered safe as a stock food. However, as a grazing crop it should always be treated with caution. Hungry stock should never be turned into a paddock of Sudan grass, but should first be allowed some roughage. It is always a wise precaution to try out a few beasts of little value, before putting the entire herd into the paddock to graze.

The crop reaches maturity very quickly and will reach the flowering stage 8 to 10 weeks after the germination of the seed. Usually two or three cuts can be obtained before the winter. When harvesting for hay it should be cut in the flowering stage. In the Central district a fair average crop of hay in a normal season is 2 tons per acre. Sudan grass may be sown broadcast, as a row crop, or planted through every grain run of the wheat drill. The last method is preferred, because it ensures a better germination and the production of a finer stemmed plant for grazing and hay making. If planted with the seed drill 10 to 12 lb. of seed per acre are sown; if broadcast, 20 lb. per acre; and if planted in drills 30 to 36 inches apart, 3 to 4 lb. per acre.

White Panicum.

Like most of the millet group, white panicum is a quick-growing hardy annual, and is suitable for grazing as well as haymaking and ensilage. Stock seem to be particularly fond of this crop and there is no risk of poisoning at any stage of its growth. To ensure a continuation of grazing, fortnightly plantings should be made from the commencement of the first storms. Plantings may be made to the end of December. Later sowing may result in short growth. White panicum takes about eight weeks to mature. If cut before reaching the flowering stage a short second growth may be secured for grazing purposes.

The best time to cut this crop for hay is when it has reached the flowering stage. If the seed is allowed to mature, a good deal of trouble will be caused by seedlings to succeeding crops. On account of the thick stalks the hay takes a long time to cure. On large areas the cutting is best carried out with the reaper and binder. The seed may be sown through the wheat drill at the rate of 10 to 15 lb. per acre; if broadcast, 20 lb. per acre.

Japanese Millet.

Japanese millet is a hardy annual, which is used fairly extensively in some districts for hay and grazing. It does not carry as much flag as some of the other millets and in some seasons in the Central district it flowers early. For these reasons it is not as popular as some of the other millets.

It should be cut at the flowering stage. Like white panicum, it is a free seeder. Sowings should be made before the end of December in order to get the best results, at the rate of 10 to 15lb. per acre if drilled and 20lb. if broadcast.

French Millet.

During the past few seasons a large area has been planted to this crop, mainly on account of the shortage of seed of other fodder crops. It makes a good hay and is suitable for grazing. It is not as suitable for use in the Central district as are Sudan grass, giant setaria or white panicum. In some seasons it is liable to seed early, and being a free seeder will give trouble in succeeding crops if allowed to mature. This crop takes from six to eight weeks to mature. The seed may be drilled in at the rate of 8 to 10lb. per acre and if broadcast at the rate of 10 to 15lb. per acre.

Giant Setaria.

This is a summer-growing annual and one of the most popular fodder crops grown in the Central district. It is an excellent grazing crop and makes a first class hay. The stem of this plant is finer than that of either Sudan grass or white panicum. It is perfectly safe to feed at any stage of its growth. Giant setaria matures in about eight weeks. Large areas are best harvested with the reaper and binder. Seed may be sown with the seed drill at the rate of 10 to 14lb. per acre and, if broadcast, at the rate of 20 lb. per acre.

Saccharine or Fodder Sorghums.

This group of sorghums is quite distinct from the grain sorghums on account of the ability of the group to yield a much greater bulk per acre and the sweet succulent nature of the stems. The saccharine sorghums are used widely throughout Queensland as a fodder crop or for making into ensilage. As with all sorghum varieties, there is always a risk of prussic acid poisoning and for this reason caution should be exercised in feeding them. It is not considered safe to feed this crop before it has reached the flowering stage.

Saccharine sorghums will withstand the long dry periods so often experienced in the Central district and will yield a bulk of succulent fodder when most other crops have failed. They are capable of yielding up to 20 tons of green fodder per acre under favourable conditions. Saccharine sorghum is one of the hardiest fodder crops grown in the Central district and takes from 3 to 4 months to mature.

Planting.

Most farmers in the district prefer to plant in drills 3 to 4 feet apart. On large areas an ordinary wheat drill may be used by blocking the drills back to the required width. Unless the ground is very free of weeds it is not wise to broadcast the seed on account of the inability to cultivate the crop. If planted in drills 4 to 5 lb. of seed per acre will be sufficient, and, if broadcast, 15 to 20 lb. will be required. To allow for winter feed the crop is usually planted in December or January.

Varieties.

Although a great number of varieties have been tried, there are only a few which have remained popular and of which it is possible to secure the seed. The most popular variety in the Central district is Saccaline. It will grow to a height of 10 feet under favourable conditions. It carries a large compact seed head, with a good quantity of grain. Other varieties which have shown promise in the district are Italian, White African and Sumac.

Maize.

This crop can well be included amongst the list of summer fodder crops worth planting in the Central district. Although it will not withstand the erratic seasons of the district as well as the members of the sorghum family, it will produce a large bulk of succulent fodder if produced under normal conditions or with the aid of irrigation. As a stock food, green maize is more valuable than the saccharine sorghums, as it has a higher nutritive ratio and there is also the fact that it can be grazed during any period of its growth without any risk of stock poisoning. Green maize makes excellent ensilage and the crop can also be grown and harvested as stover.

Planting.

When planting for fodder purposes it may be either planted in drills or broadcast. To assist in harvesting it is best planted in drills 4 ft. apart, for which purpose from 8 to 10 lb. of seed per acre will be required. If broadcast, 15 to 20 lb. of seed per acre are sown. Although broadcasting is not recommended as a general rule, it may be found more convenient to do so at certain times, especially on badly prepared rough ground or newly broken up pasture land.

Cow Cane.

Cane is a valuable bulk fodder, containing mainly carbohydrates. It produces a tremendous crop of a succulent sweet growth, which can always be used as a standby in a dry time, an acre or two of this heavy yielding fodder being invaluable on most farms to tide over until rain falls. Fed with a small amount of concentrates, cow cane will be found to be a very useful fodder. This crop is very subject to frost; although a light frost may scorch the tops, the main crop will remain unharmed.

Planting.

The crop is planted from October to March. Sets containing at least two eyes should be planted in drills 5 ft. apart and 18 inches apart in the drills. With this spacing, 5,800 sets per acre will be required. The usual method of planting is to run out a furrow and lay the cuttings along the bottom of the furrow, covering the plants at first with only half the soil removed. When the plants commence to grow the remainder of the soil may be moved into the furrow. If the plants are covered too deeply at first a poor strike may result.

Varieties.

For some years prior to the war cow cane varietal trials were carried out in the Central district by departmental officers. In these trials the variety China x Java yielded 48 tons per acre under non-irrigated conditions. This variety is now the most popular grown in certain parts of the district. Cuttings of this variety can generally be secured from farmers in the Mt. Larcom district at a reasonable rate. If it is intended to plant a few acres to this crop, the cheapest way is to purchase a few thousand cuttings, from which sufficient plants could be secured the following year to plant a number of acres.

Pumpkins.

During every hard winter farmers are looking for some bulk crop to back up the supply from the usually meagre dry pastures. For this reason and because of its heavy yield and keeping capacity, the pumpkin can be classed as a valuable fodder. The most suitable soil for this crop is a good friable loam with a high organic matter content. Large areas suitable to the growth of pumpkins can be found on the coastal and inland areas of the Central district. The crop is very subject to frost. Yields of up to 20 tons per acre are quite common in the district. The crop takes from five to six months to mature.

Planting.

No definite time can be set down for the planting of pumpkins, though July to December can generally be considered suitable months. November and December are most suitable for the dry inland areas, in order to avoid the sun scalding the fruit during the hot summer months. On the coastal areas where there is no danger of frosts, some farmers plant as late as March or April, although the results from such late plantings are usually light. Planting is in rows 8 to 10 ft. apart, with 4 ft. between the plants in the rows. It is usual to drop two or three seeds at each spacing. The amount of seed required per acre is approximately 2 lb.

Plate 48.
A CATTLE PUMPKIN CROP.

Harvesting and Storing.

During dry, cold winters pumpkins will last for many months in the field. However, if it is intended to store them for any length of time great care should be taken in handling them. The fruit should not be harvested until mature, and when doing so care must be taken not to break the stalk close to the fruit, as this will allow entry of decay organisms. It is not wise to stack in heaps, as heating is liable to occur; where possible, pumpkins should be stacked in single layers.

The most popular cattle pumpkins are the Mammoth Cattle, Mammoth Yellow and Mammoth Chili. Seed of these individual varieties is very seldom procurable, but is contained in mixed lots. On account of their ability to yield heavier and keep better, some farmers prefer to plant the table varieties such as the Queensland Blue, Crown and Triamble.

WINTER CROPS.

Wheat.

Preparation of Land.

The ground should be ploughed as soon as possible in the early summer months for wheat intended for winter fodder. The soil should be left in this rough state to take in all subsequent falls of rains. If weed growth becomes very troublesome it may be necessary to disc harrow the field on a number of occasions. Just prior to planting the soil should be worked to a fine tilth to receive the seed. At one time it was considered necessary to plough deeply for wheat, but experiments have proved otherwise. It is considered that the most suitable depth is in the vicinity of 5 inches. Deep ploughing for wheat will sometimes cause a failure of a crop, especially in a dry season.

Planting.

Planting is best done with a seed drill, as the seed is placed to the desired depth and into the moist soil. If broadcast, some of the seed will be on the dry surface soil until the next rains occur and that will mean an uneven and sometimes a faulty germination. When the usual planting rains are delayed it is quite a common practice to sow dry. This is often justified when the area is large and the length of time in sowing the seed is likely to be delayed. The depth of planting the grain will depend largely on the type of soil. A fair average depth would be from two to two and a-half inches. On loose soils the depth should be deeper than on clayey soils. It is usual to plant 45 lb. of seed per acre if drilled and 60 lb. if broadcast. Wheat planted from March to late June usually gives the best results.

Grazing.

Wheat should be lightly grazed when the plants are about 12 inches high. To prolong the length of grazing the crop should be alternately grazed, to allow the plants time to recuperate. Constant grazing will shorten the life of the plant.

Varieties.

The most suitable varieties to plant for grazing purposes in the Central district are Clarendon, Florence, Warren and Warchief.

Haymaking.

The best time to cut a wheat crop for hay is not later than eight days after flowering. The grain should not be allowed to mature, as at this stage the chaff is more indigestible. Harvesting is best done with the reaper and binder.

Oats.

The most popular winter grazing crop in Queensland is oats. If sown sufficiently early, three or four grazings can be obtained from a crop of oats assuming that favourable conditions are experienced. Because of its susceptibility to rust, the area planted for hay purposes in Queensland is small. To obtain the best results with a crop of oats, the ground should be early and well worked. Sowings may take place from February to June. As with other grain crops sowings are best made with the seed drill or combine. If it is necessary to sow broadcast, the seed should be scattered after a tine implement has been over the ground, leaving it slightly ridged. After sowing the seed a light harrowing will be sufficient to cover it. The sowing rate is 40 to 50 lb. per acre if drilled and 60 lb. per acre if broadcast.

Varieties.

Although Algerian, one of the slow-growing varieties, is grown largely for grazing in the southern part of the State, it has not proved to be of much value for this purpose in the Central district. Sunrise, Mulga, Belah and Buddah have given good results as grazing oats in this district. Of these, Belah has proved to be the most successful and has given the longest grazing.

Barley.

Compared with wheat or oats, barley has a rather poor rooting system and tends to pull up readily when grazed on loose soils. On the heavy types of soil it can be classed a good grazing fodder. It provides early green feed and can be grazed off repeatedly. Any moderately rich soil is satisfactory for the crop. The most suitable period for planting is from March to June. May and June plantings are usually made for grain production. The rate of sowing when drilled ranges from 45 to 60 lb. per acre and when broadcast 75 lb. per acre. Cape and Skinless are considered the most suitable varieties for green feed purposes and of these the Skinless has given the best results in the Central district.

Rye.

Although very satisfactory crops of rye have been grown in the Central district, it is not a crop that is generally grown. It is more suitable for fodder production on poor soils than the other cereals. Although it can be used in a rotation with other crops, past experience has shown that it cannot be compared with wheat or oats as a winter grazing crop in the Central district. The best known varieties are Black Winter and Emerald. Rye should be sown at the rate of 40 lb. per acre if drilled and 50 lb. per acre if broadcast. The crop does not make a suitable hay, as the stalk is too hard.

Rape.

Rape is suitable for autumn sown pasturage. It is a very quick grower and will be fit for grazing in 10 to 12 weeks. It will stand grazing longer than the cereals. The crop may be planted in drills two to three feet apart or broadcast. If planting in drills 3 to 4 lb. of seed per acre will be sufficient and 8 lb. per acre if sown broadcast. The most suitable planting time is from March to May. Later plantings in the Central district will be subject to heavy aphis attack in the early spring months. Care should be taken in grazing stock on rape as it is liable to cause bloat and also to taint milk. It is an excellent grazing crop for pigs. The Dwarf Essex variety has given the best results.

Field Pea.

Field pea is a useful nutritious crop in certain coastal districts for the production of green feed and hay. For the successful production of this crop, a fairly high average winter rainfall is required, and for this reason it cannot be recommended as a fodder crop in the Central district. The crop is occasionally tried and at times with success. Pure stands of field pea are not recommended for grazing purposes or for hay; the usual practice is to plant it in conjunction with wheat or oats at the rate of 20 lb. of field pea seed to 40 lb. of wheat or oat seed per acre.

If the crop is grazed a good deal of waste occurs so that it is preferable to cut it and feed in the green state. Field pea makes an excellent hay, although it takes a long time to cure on account of the thick stems.

Mangold.

The roots of this crop produce a heavy crop, which is a valuable winter feed for farm stock in the Central district. Seed should be planted in drills three feet apart. The crop takes a lot of attention, so that large areas should not be attempted unless labour is available. A sowing rate of 5 to 7 lb. per acre is sufficient, and plants should be thinned out to 18 inches in the drill. It takes from six to seven months to mature. The crop will provide a heavy tonnage of succulent fodder during the usual dry months following the winter in the Central district. The most suitable varieties for this district are Yellow Globe and Mammoth Long Red.

VEGETABLE PRODUCTION

Deterioration of Unlimed Vegetable Soils.

G. L. WILSON, Horticulture Branch.

ON intensively cultivated market-garden soils, where heavy fertilizing, irrigation and frequent cultivation are practised, the loss of lime and magnesia is often very considerable, and this loss is accentuated by the removal of an appreciable quantity of these materials in the heavy crops which are taken. Unless the loss of lime and magnesia is made good, marked decline in the productivity of the soil inevitably follows.

Adverse effects due to lack of these substances manifest themselves in a variety of ways. In the first place, the soil becomes more acid or less alkaline, which although not necessarily directly detrimental to the plants themselves in most Queensland vegetable soils is very harmful. In its more advanced stages the soil structure deteriorates to an extent which renders it impracticable to produce that good tilth so essential for small crops. In the second place, lime and magnesium are in themselves, plant foods, and an adequate supply of each is essential for normal growth. On certain soil types, especially the red volcanic soils which constitute much of the market garden area in the Brisbane district, an important secondary effect is that the highly acid soil reacts with added phosphates to convert them rapidly to a form which is not available to the plants. The plants are then, in fact, starved of phosphate, resulting in a serious check to normal growth. This process is commonly known as phosphate fixation.

To prevent this soil deterioration, it is necessary then on many soils to include regular limings in the soil management programme. The amount required may be taken as about 30 cwt. to two tons every 2 to 3 years on typical red soils of the Brisbane district. Dolomite should be occasionally substituted for lime, as it supplies magnesia in addition to lime. The lime used must be very fine, otherwise it acts too slowly, and should be spread as uniformly as possible to permit thorough mixing with the soil. It is important that the lime (or dolomite) be uniformly distributed through the soil, otherwise localized patches with the bad effects of the lime deficiency remain. Furthermore, working in of the lime should precede the fertilizing of the land for subsequent crops by at least a few weeks. This allows the lime to neutralize the excess acidity of the soil. Simultaneous application of lime and fertilizer permits some of the phosphate to react with the as yet unneutralised soil, while the lime itself reacts with the phosphate to form insoluble compounds, representing a further loss. It will be found that the best results are obtained if the liming is carried out prior to, or at the stage of, working in of green manure crops.

It should be noted that many of our best vegetable-growing soils are slightly acid, so that a certain degree of phosphate fixation occurs on them. The more completely the phosphatic fertilizer is distributed through the soil, the greater is the opportunity for this reaction to proceed. Accordingly, broadcasting fertilizer results in a considerable amount of waste, so that it is recommended that the fertilizer be applied in the drill prior to planting. This results in the extending plant roots reaching a concentrated source of phosphate early and, in addition, the fertilizer remains available to the plants for a long period because of the relatively slow loss by fixation. Furthermore, coarsely ground superphosphate is preferable to fine, because it does not mix thoroughly with the soil.

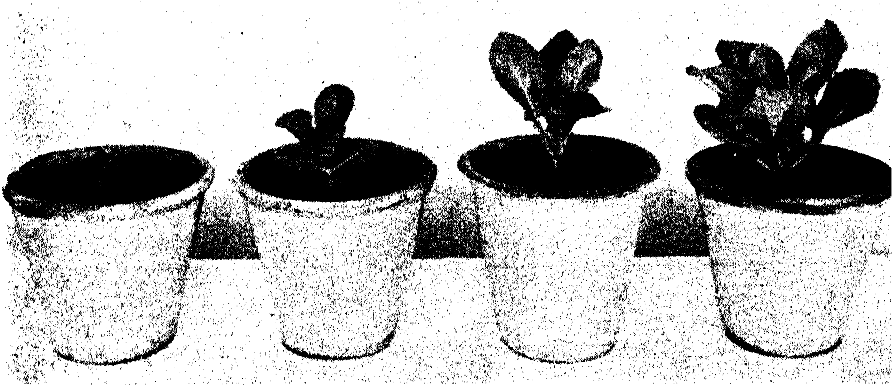


Plate 49.

EFFECT OF DOLOMITE ON SOIL LOW IN LIME AND MAGNESIA.—From left: Untreated soil, dolomite, fertilizer only, dolomite + fertilizer.

The problem continues to exist in the application of top dressings containing phosphate. The only way the dressing is able to reach the roots is by passing down in solution in rain or irrigation water. While nitrogen does this freely, and potash fairly well, phosphate in solution is in an ideal condition for being fixed by the soil, so that on a soil with high fixing capacity much of the phosphate in a dressing never becomes available to the plant, at least under normal watering conditions. Excessively heavy rain or irrigation as the first watering on the dressing would carry it down, but at the same time would cause a large loss of the nitrogen by washing this too deep. Therefore, it is safer to apply the total phosphate in the drill before planting.

Recently two striking examples of this trouble were brought to notice. One was at Victoria Point, where portions of formerly highly productive land supported only mediocre growth of tomatoes. These were followed by maize, for green manure, which did poorly on the corresponding area. At the following ploughing the soil was observed to be much harder than the adjoining satisfactory soil. Carrots were then planted, germinated uniformly, but fell away on the bad patches, where they eventually became a total loss. Soil analyses showed that the affected soil was extremely deficient in lime and magnesia. Liming had not been carried out for many years, and the onset of the trouble had doubtless been hastened by heavy dressings of sulphate of ammonia on bananas grown on this area prior to the sequence of small crops on which the trouble had been observed. It may be noted that sulphate of ammonia is probably the most important factor in hastening the loss of lime and magnesia from the soil.

The second example came from Tamborine Mountain, where there was a complete failure of cauliflowers on portion of land planted to that crop, and a subsequent green manure maize crop failed on the corresponding area. Analyses showed that the soil was deficient in lime and magnesia and, further, the maize exhibited the typical leaf colouration of severe phosphate deficiency. In the preparation of this soil for the cauliflowers the fertilizer had been broadcast, and when the plants failed to make proper growth several top dressings were applied, but without effect.

A small trial in pots showed that cauliflowers made no growth on the untreated soil. Normal growth occurred on soil treated with fertilizer containing phosphate, while soil treated with both dolomite and fertilizer gave even greater response. The essential results of this trial are shown in Plate 49.

Plate 50.

THE ROAD FROM THE COAST AT WEST PALMERSTON, NORTH QUEENSLAND.

LANT PROTECTIO

Passion Fruit Mite.

W. J. S. SLOAN, Agronomist.*

THE passion fruit mite[†] is a common, but frequently unrecognized, cause of the unthrifty appearance and premature death of passion fruit vines. The pest has been known in central Queensland and further north for some time, and has recently attracted attention in southern Queensland.

Type of Injury.

Passion vines may be attacked at any age and even young plants show severe injury if growing conditions are unfavourable. The older leaves of the vine turn yellow prematurely. These then die and are shed. The injured surface of the canes becomes covered with a rusty-red corky layer showing small cracks. This injury persists even after the mites have been checked and gives an indication of the extent of previous infestations. Heavy attacks over a long period may cause the shedding of the greater part of the foliage, leaving many canes bare except for the terminals. Buds in the axils of affected leaves may fail to develop or produce only yellowish stunted growth. Not infrequently, the less sturdy laterals die back to the main cane. A moderate attack will bring about a serious loss of vigour, while severe attacks over a prolonged unfavourable growing period may lead to the death of the entire vine. The general picture of a mite-affected vine is that of one suffering from lack of soil moisture.

Injury to the fruit occurs only in heavy infestations and is at first restricted to the stalk end, particularly under and around the calyx. Later, mites may be more freely distributed over the surface and water-soaked areas then disfigure the rind. These later dry out, leaving dull-greyish areas which are sometimes tinged with reddish-brown (Plate 51). The affected fruit may fail to develop fully.

Usually, the mite causes little apparent damage in spring, so long as the vines are making good progress, but injury may become pronounced later in the warmer months, especially if growing conditions are such as to retard growth and if the vines are fruiting heavily. Vines that are heavily infested in the summer and early autumn make a partial recovery during winter and subsequently the growth may proceed normally until mite populations again become high during the following summer.

---

[*] Formerly an officer of the Science Branch.

[†] *Tenuipalpus californicus* Banks.

The Mite and Its Habits.

The passion fruit mite was first recorded from Queensland some years ago. It occurs on a number of host plants but is an important pest only on passion fruit vines. Other known hosts are citrus, tomato, choko and sweet potato. The adult mite (Plate 53) is approximately one hundredth of an inch in length and bright red in colour. Individual mites are almost invisible and the reddish colour appearing on heavily infested plants is due to the extremely large number congregated together in one place. The mites are normally sluggish and do not move freely over the plants

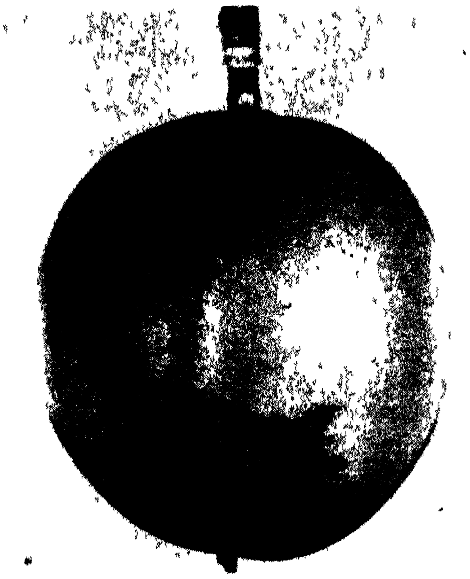


Plate 51.

PASSION FRUIT SHOWING MITE DAMAGE ON SURFACE AT RIGHT

Colonies usually include the pest in all stages of development. The eggs are bright red in colour and almost spherical in shape. These eggs give rise to six-legged nymphs which are less vividly coloured than the adults. The nymphs grow through a number of moults to the adult eight-legged stage, leaving their whitish cast skins on the plant surfaces.

Although cast skins (Plate 52) may be plentiful living mites are rarely found on the older and first injured portions of the vine, which appear to be unattractive to further feeding, nor are they often found on the tips of the growing terminals. Hence, the pest should be sought on that portion of the stem immediately in front of the bare section of the affected cane. Here the mites may be densely congregated in the leaf axils, along the grooves in the canes and leaf stalks, and along the main veins of the leaves. Passion vines are frequently grown in red soils and mite infestation may be mistaken for dust deposits settling on the plant following cultivation. Identification can be established easily by means of a hand lens. The pests reach their maximum abundance in mid-summer. In late autumn, winter and early spring they are less numerous and destructive.

Plate 52.

Blossom End of Mite-infested Passion Fruit x 6.—Note the innumerable cast skins.

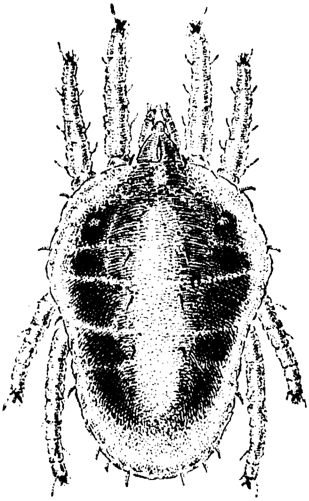


Plate 53.

Passion Fruit Mite x 200.

Control.

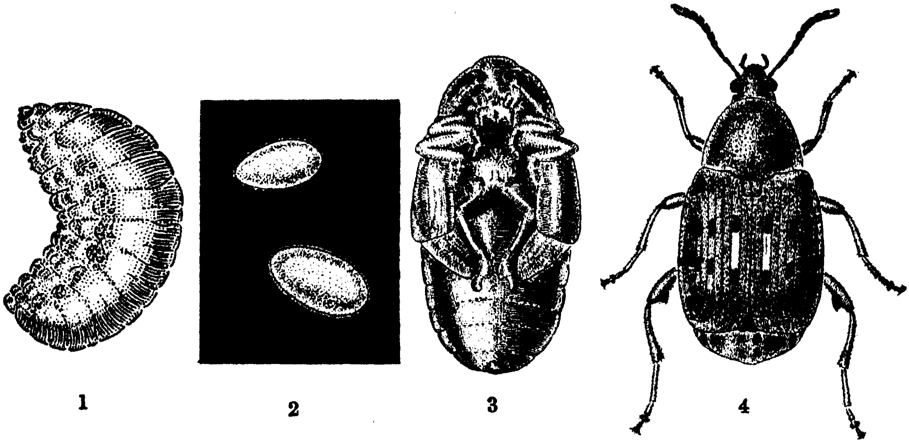
Like many other mites, the passion fruit mite can be checked by the application of sulphur sprays and dusts. Some growers in the Rockhampton district have successfully used lime sulphur sprays at dilutions of 1 in 25 to 1 in 40, the weaker solutions being applied in hot weather. Sulphur dusts containing one part of ground sulphur to one part of hydrated lime also check the pest, but they are less satisfactory than sprays because the dust is not held as well as the spray by the smooth leaves and canes of the passion vine. If possible, the plants should be dusted when they are wet with dew; a fine day following an overnight storm provides good conditions for dusting. Treatment may be required at monthly intervals, from September to February. Applications should be repeated if the sulphur is removed by rain within 48 hours. Some growers also claim to have obtained effective control with a white oil spray emulsion. When copper sprays are being applied for the control of brown spot, sulphur, in the wettable form, can be added to the fungicide.

Protection of Stored Cowpea Seed Against Insect Damage.

R. C. CANNON, Assistant Entomologist.

THE principal insect pest of stored cowpeas is a small weevil (Plate 54), technically known as a Bruchid, which may be responsible for considerable wastage if the seed is stored for any length of time without taking suitable precautions to protect it.

Adult Bruchids are broadly-built weevils, measuring about one-sixth of an inch in length, brownish to reddish-brown in colour, with hind wings which do not quite cover the tip of the abdomen. The elongate-oval, white eggs are laid singly and firmly attached to the seed-coat. From these emerge small white grubs which immediately bore into the seed, leaving little trace of their points of entry. They feed voraciously, often completely devouring the contents of the seed and leaving only the outer skin intact. The pupal, or resting, stage of the insect is spent within the seed and the adult later escapes through a circular hole, about one-twelfth of an inch in diameter, which it cuts in the seed-coat. Often these holes are the first indication to the grower that his seed is damaged.



[*Drawings by William Manley.*

Plate 54.

BEAN BRUCHID.—Fig. 1, Larva × 10; Fig. 2, Egg × 25; Fig. 3, Pupa × 10; Fig. 4, Adult × 10.

Infestation may commence in the field before the seed is harvested, but as this is usually only slight, control measures are not recommended at this stage. However, once the seed has been harvested, prompt action is required to protect it in storage. Treatment must be such as to afford protection against insect attack without interfering with the germinating capacity of the seed. Three methods of treatment are open to the grower, viz.:—(1) treatment with paradichlorobenzene or naphthalene; (2) dusting with an "inert" mineral dust, such as magnesite; and (3) dusting with D.D.T.

Fumigation with carbon bisulphide is normally reserved for the treatment of seed stocks already heavily infested and, as it has no lasting value, it is not strictly protective.

Paradichlorobenzene and Naphthalene.

Paradichlorobenzene and naphthalene are slowly-evaporating crystalline materials which can be conveniently used for the treatment of small quantities of seed. The cost of these two fumigants is considerably higher than that of other protective materials and this tends to make their use on large quantities of seed uneconomic. If the seed is stored in reasonably airtight containers either of these fumigants may be used at the following rates:—Paradichlorobenzene, 4 oz. per bushel; naphthalene, 8 oz. per bushel. The fumigant should be thoroughly mixed with the seed when it is placed in the containers. If suitable airtight containers are not available, and the seed is to be stored in bags, it should first be treated with a mixture of both fumigants at the rate of 8 oz. of each per bushel.

Magnesite.

Recently, an "inert" mineral dust, magnesite, has come into prominence for the control of pests of stored grain. Magnesite is not poisonous in the usual sense of the word, but kills by removing water from the body of the insect. It may be mixed with the cowpea seed at a rate of 4 oz. per bushel. Unfortunately magnesite loses some of its efficiency when the seed is stored in a humid atmosphere, and it is doubtful whether it would effectively control the cowpea Bruchid during the wet summer months. For this reason, its use is not favoured in northern Queensland.

D.D.T. Dusts.

Recent investigations indicate that D.D.T. dusts are of value in controlling Bruchids in cowpea seed. Two ounces of a dust containing 2 per cent. D.D.T. should be sufficient for the treatment of each bushel of seed. Seed treated with a D.D.T. dust may be stored in bags, as this insecticide gives permanent protection against reinfestation. Treatment must be carried out before the cowpeas are damaged to any extent, as insects within the seed may not come into contact with the insecticide until they reach the adult stage.

Method of Applying Dust.

The quantities of dust required are relatively small and care should be taken to ensure that each seed receives a uniformly fine coating of dust. This can be achieved by transferring the shelled seed from one container to another before bagging. A suitable container is a kerosene tin holding approximately one-half bushel of cowpea seed. One-quarter of the quantity recommended per bushel (1 oz. magnesite or ½ oz. D.D.T. dust) should be placed in the bottom of the kerosene tin and the seed poured in. An equal quantity of the dust is added when the tin is nearly full. The contents should first be poured rapidly into another tin and finally into the bag in which the seed is to be stored.

Carbon Bisulphide.

When cowpea seed already shows signs of infestation, further deterioration can best be prevented by fumigating the seed with carbon bisulphide and then treating it with a D.D.T. dust. The fumigant will destroy adult, larval and pupal stages of Bruchids while the dust will protect it from any reinfestation from outside.

Carbon bisulphide was one of the earliest fumigants used in the treatment of stored seeds. It evaporates rapidly and forms explosive mixtures with air, so that it must be handled with extreme care and must not be exposed to lighted matches or cigarettes. The seed to be treated should be placed in an airtight container, such as a tank with a tightly fitting lid, and carbon bisulphide added at the rate of 4 to 5 lb. per 1,000 cubic feet capacity. After the container has been filled with seed the carbon bisulphide should be poured into shallow containers, or poured on to folded hessian placed on top of the seed, and the lid placed in position. Being heavier than air the gas will diffuse through the contents and the fumigation will be completed within 24 hours. Contact with this fumigant for a longer period may impair the germination of cowpea seed, so that after 24 hours the container should be opened and the seed removed, aired, treated with a D.D.T. dust, and then placed in fresh containers, or bags, for storage.

ANSWERS.

(Selected from the outgoing mail of the Government Botanist.)

Ringworm Bush.

T.G. (Ayr)—

The specimen is Ringworm Bush (*Cassia alata*), a native of tropical America, but now widely spread over most tropical countries. It is naturalized in parts of North Queensland. The leaves are used as a remedy for skin diseases, especially for ringworm, hence the local name.

Gomphrena Weed.

H.A.C. (Jackson)—

The specimen is Gomphrena Weed (*Gomphrena decumbens*), a native of tropical America, which made its appearance in Queensland about Townsville. It is now spread as far south as Brisbane, is quite common in parts of the Brisbane Valley, and as far west as Hughenden. Your specimens are the first from the Downs.

The plant is not known to possess any poisonous or harmful properties. Stock have not been observed eating it to any extent. This seems strange, as some allied plants in Queensland are freely eaten and are quite good fodders. Gomphrena Weed seems to thrive on rather light soils, but is not restricted to them.

Josephinia Burr.

Inquirer (Surat)—

The specimen is Josephinia Burr (*Josephinia Eugeniae*). This burr has a fairly wide distribution over the Central West, but your specimen is the first from your locality. The burrs become entangled in wool, and are thus spread by sheep from one place to another.

Feather Top.

H.M. (Cooyar)—

The specimen is Feather Top, sometimes known as Feather-top Rhodes Grass (*Chloris virgata*). This grass is very abundant in parts of Queensland. It has over-run much of the lucerne-growing country, and reduced the earning capacity of the fields. It is a luscious-looking grass of robust growth, but so far as our experience goes, stock do not take readily to it; where it grows, ordinary Rhodes Grass can generally be grown. Although stock do not eat it in its green state, they seem to eat it when drying-off or made into hay.

Oleander is Poisonous.

R.W. (Barcaldine)—

The Oleander is poisonous to all classes of stock, as proved repeatedly by feeding experiments. Humans have sometimes been poisoned by chewing the flowers and leaves.

Black Rot and Black Leg of Cabbage and Cauliflower.

F. W. BLACKFORD, Pathologist

BLACK rot is the most frequently encountered disease of the cabbage and cauliflower in Queensland. It is a bacterial trouble which is particularly severe in summer-grown crops of cabbages. The second disease, black leg, is a fungous disease which is also sometimes present in both these vegetables. Because of the similarity of the control measures recommended for the two diseases, they can appropriately be discussed together.

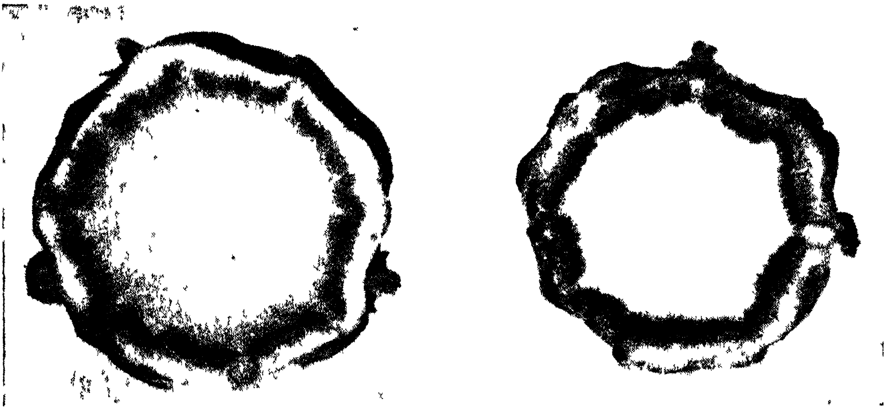


Plate 55.

BLACK ROT OF CABBAGE.—Cross section of the stems of a healthy plant (left) and a diseased plant (right) to show the blackened water conducting vessels.

The most characteristic symptom of black rot is the discolouration of the water-conducting vessels in the stem of an affected plant. These vessels become black in colour and if the stem is cut across they appear as black pin points or, in advanced cases, as a black ring. (Plate 55.) If the stem is split longitudinally they appear as black streaks. The bacteria* which cause this disease gain entrance to the water-conducting vessels through the leaves, where, at the point of infection, which is usually near the margin, patches of the leaf-blade dry out and turn brown and papery. Severely affected plants are somewhat stunted and, especially in wet weather, other organisms gain entrance to the heads and a foul-smelling, slimy rot ensures.

The black rot bacteria may infect the seed both internally and externally and infection of the leaves may take place in the seed-bed by the splashing up of drops of water from the soil which has become contaminated from infected seed. Refuse from previous cabbage or cauliflower crops rotting in the soil may also harbour the parasite for twelve months or more.

In the case of the second disease, black leg, the first symptom noticed by growers is generally the failure of certain individual plants to keep pace in growth with the rest of the crop. Close examination of such plants reveals the presence of a black shrunken area on the stem at ground level. This lesion may extend sufficiently to girdle the stem, in which case the plants die. An examination of the seed-bed from which such plants were taken frequently discloses the presence of the lesion on at least some seedlings and these may be stunted, yellow and occasionally wilted. If seedlings which are only slightly affected—and slight infection is easily overlooked—are planted out, the stems may become severely infected later and an uneven, unsatisfactory crop is the result.

---

* *Pseudomonas campestris.*

The disease affects the leaves and also the seed-heads, if the crop is allowed to seed, and produces, brown, dead spots studded with black pin points. The latter are the spore-bearing bodies of the fungus* causing the disease. The individual spots on the leaves may be up to half an inch in diameter and on the seed-heads the disease appears as elongated, shrunken areas on the stems and pods. The seed may be infected from these spots, the fungus even penetrating the outer seed-coat to lie dormant in the internal tissues until the seed is sown. Rotting plant debris in the soil from a diseased crop may also harbour the fungus.

Control.

The first precaution to be adopted in an endeavour to exclude these two diseases from a crop is in the choice of the seed-bed site. This should be on land that has not previously grown cabbages, cauliflowers or turnips, and at some distance from land which has produced these crops. If this is not possible, then the soil should be sterilized by heat or chemical treatment. The next step is the adoption of some form of seed treatment in order to eliminate the possibility of introducing the disease through the medium of infected seed, for in both cases the disease may be carried by the seed.

In the case of black rot, the bacteria causing the trouble are mainly carried externally on the seed-coat and these external bacteria can be dealt with by dipping in a corrosive sublimate solution at a strength of one in one thousand by weight. Corrosive sublimate may be obtained from a chemist in tabloid form together with directions for making up a solution of this strength. The seed is enclosed in a loosely-tied cheese-cloth or muslin bag and immersed for half an hour, the bag being agitated to dislodge any air bubbles. The seed is then rinsed for five or ten minutes in several changes of clean water, dried in the shade and sown without delay.

This dipping, however, will not dispose of such black rot infection as may occur inside the seed, and as the fungous parasite which causes black leg is carried within the seed the corrosive sublimate dipping will be quite ineffective in the case of the latter disease. Hence, although black leg is much less frequently encountered than black rot, growers may prefer to use the hot water treatment in order to obtain a complete control of seed infection in the case of both diseases, even although this method requires more care than the corrosive sublimate dipping.

The hot water treatment requires suspension of the seed in hot water for half an hour, the water being kept at 122 deg. Fahrenheit or 50 deg. Centigrade. This treatment kills the infection without harming the seed unduly, provided the seed had high vitality originally. Care must be taken to maintain the exact temperature for the stated time because too low a temperature will not kill the parasitic organism, while too high a temperature will kill the seed. For this purpose, an easily read thermometer, costing approximately 5s., is required.

---

* *Phoma lingam.*

The main difficulty with this method of treatment is maintaining a steady temperature. It has been found that as large a bulk of hot water as is convenient to handle is of great assistance in this respect. One-and-a-half to two gallons is a convenient amount for quantities of seed up to 2 lb.

There are several ways in which the temperature of the water may be kept constant and a grower may be able to devise some method to suit himself. One which can be used is to have a kerosene tin half full of water at the required temperature and then as the temperature shows signs of falling the tin is placed for a very short time over a very slow fire or small flame such as a kerosene light. There is a disadvantage in this method in that it is quite easy to raise the temperature too much and kill the seed. To some extent this may be overcome by having a quantity of boiling water handy and, as the temperature falls, adding small amounts to the water in which the seed is steeped, sufficient to raise the temperature again to the required figure. Care, however, must be taken not to pour the boiling water on the seed or some loss in germination will result.

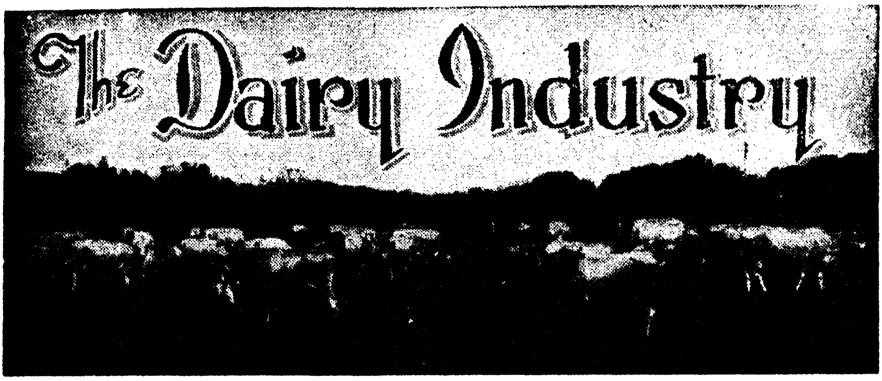
The method which has been found to be most convenient on the farm is to use the largest saucepan or preserving pan three parts full of water warmed to the required temperature on the wood stove in the kitchen. The best time of day to treat the seed is when the hot meal is being cooked. The top of the stove is then hot and the recess warm and, if the saucepan or preserving pan of water is placed on the stove towards the edge away from the fire-box, the temperature will remain constant for a considerable period. It is a good plan, however, to have small quantities of hot and cold water readily available in case the temperature falls or rises. If the temperature begins to rise then it can be checked by adding cold water and the container moved further away from the fire to the cooler part of the stove or *vice versa* if the temperature shows signs of falling.

The seed is best held in a cheesecloth or muslin bag, as is the case with the corrosive sublimate treatment. When placed in the water the mass of seed should be well poked a few times with a stick to remove all air bubbles, making sure that all the seed is wetted. The water should be kept well stirred and the thermometer held in the water the whole of the time the treatment is in progress.

When the full thirty minutes of treatment have elapsed the seed is plunged into one or two changes of cold water, spread out to dry in the shade and sown without delay.

Any diseased plants which may appear in the seed-bed in spite of the adoption of the above precautions should be discarded when transplanting, and, if infection is serious—a development which should not occur if the seed-bed precautions have been properly observed—consideration should be given to discarding the whole bed because even such plants as may appear healthy in a heavily infected bed are nevertheless likely to be infected with the disease-producing organisms.

As both diseases will remain in infected leaves, stalk butts and other debris left in the field after a crop has been harvested, all such debris should be gathered up and burned. Any diseased material unavoidably left unburned should be given an opportunity to decompose—thus allowing the disease producing organisms to die out—by planting cabbages, cauliflowers, turnips or allied crops on the same land only once in every three or four years.



Observations on Dairy Production in New Zealand.

E. B. RICE, Director of Dairying.*

THE economy of New Zealand is mainly dependent on primary production. Animal production, especially sheep and dairy cattle, is the main source of agricultural wealth. This dominance of animal production is accounted for by the system of grassland farming which has developed in the Dominion primarily because of the climatic influence.

Soils and Pastures.

The soils in the chief dairying districts are obviously of high fertility. In some districts the soil is naturally fertile, while in others fertility has been built up by topdressing with lime and superphosphate, coupled with heavy stocking. To assist farmers in improving their pasture, agricultural lime is carried free up to 100 miles on the railways. Lime is applied at the rate of up to 10 cwt. per acre annually; in some districts, in which the lime content of the soil is naturally adequate, liming is not practised. Superphosphate is also now generally used, the rate of topdressing being about 4 cwt. an acre annually.

Topdressing of pasture lands with lime and superphosphate, which has been most marked since 1920, has greatly improved pastures with a consequent increase in dairy production. This is clearly shown by the comparative figures for 1921-22 and 1940-41—

Year.	Cows in Milk.	Production of Butter.	Production of Cheese.
1921-22	1,015,000	62,881 tons	63,427 tons
1940-41	1,780,000	167,753 tons	122,371 tons

It is recorded that after the opening of certain lands for dairying in the Rotorua district, although apparently pastures had become well established, stock did not thrive or produce and calves were incapable of being reared. The cause became known as "bush sickness" and the localities where it occurred was called "bush sick" country. The trouble was traced to cobalt deficiency in the soils. It was completely rectified by the use of 4 oz. of cobalt to the acre, included in the topdressing material.

To conserve superphosphate in wartime, the use of serpentine superphosphate in the North Island was made compulsory. This fertilizer is manufactured by combining 25 per cent. of serpentine rock, of which there are large deposits in New Zealand, with 75 per cent. of superphosphate. The resultant magnesium phosphate is claimed to be superior to ordinary superphosphate, inasmuch as it is less "fixed" in the soil.

---

* In a report of a recent official mission to New Zealand.

Departmental and other opinion was unanimous that the fertility of dairying lands in the Dominion is improving. This is attributed to topdressing and the nutrients returned to the soil in the dung of stock concentrated for rotational grazing in the pasture paddocks.

Climate.

The climate of the North Island, so suitable for dairy production, is characterized by an adequate, evenly distributed rainfall throughout the year, moderate temperatures and long sunshine. Stock can always be kept in the open and pastures grow almost throughout the year. There is, too, little seasonal change in the appearance of the vegetative cover; it is almost constantly green. The South Island has a lower rainfall and cooler climate, with a fairly severe winter, and consequently a shorter pasture season than the North Island.

Dairying is concentrated in districts of safe and sufficient rainfall and this, together with moderate temperatures and abundant sunshine, is conducive to grassland farming probably unsurpassed in the world. High dairy production off pastures is maintained in the North Island for eight or nine months of the year. During the remaining months (mid-May to mid-August), when pasture growth is at its lowest, almost the whole dairy cow population, exclusive of cows in herds supplying city milk requirements, is dry. This almost complete cessation of dairying for about three months contrasts sharply with Queensland conditions, where there is a longer "off" season, with a low trough for three months, but not an almost complete stoppage of milking.

The even rainfall in New Zealand also prevents the wide fluctuations in dairy production from month to month and season to season characteristic of dairying in Queensland and other Australian States. It is stated that the maximum seasonal influence in New Zealand would not affect production more than 10 per cent.

Dairy Cattle and their Products.

In the Dominion in 1943-44 there were 1,700,000 dairy cows in milk, with an average yield of 224 lb. of butterfat. Approximately 87.5 per cent. of the dairy cows are on the North Island and 12.5 per cent. on the South Island.

Dairy farms total 70,000, but a feature of New Zealand dairying is the large number of small herds of fewer than 25 cows. Many owners of smaller herds do not depend entirely on dairying for a livelihood and the cows are kept to augment family earnings.

As in Australia, dairy farming in New Zealand is conducted largely by family labour, with only limited dependence on hired labour. The tendency on large farms appear to be to build another cottage on the property and to employ a married couple.

The total amount of butterfat produced was 374,000,000 lb., which was estimated to have been put to the following uses:—

Butterfat Used for (figures quoted in million lb.)

Butter.	Cheese.	Milk and Cream Consumed.	Other Dairy Products.	Calves, &c.
263	81	17	5	8

Comparative Australian and New Zealand butter and cheese outputs in the year recorded were:—

	Butter.	Cheese.
Australia	154,000 tons	35,000 tons
New Zealand	140,000 tons	92,000 tons

The area of sown grass was 17,500,000 acres, of which 3,370,000 acres were topdressed. The area of grasses and clovers cut for hay and silage was 528,000 acres, and 46,000 acres of lucerne were cut for hay or silage.

Some interesting data are available from the report of the New Zealand Dairy Industry Commission. Although its investigations were made in 1933-34 the information is still applicable. From its survey of 550 farms on North Island, milking 31,636 cows, the following information emerged:—

Average butterfat per acre	117.7 lb.
Average yield of butterfat per cow	254 lb.
Average number of cows per 100 acres ..	46.4 lb.
Average butterfat per labour unit	5,380 lb.
Average area per farm	124.1 acres

The carrying capacity of dairy farms is about two milking cows to three acres with an additional 20 per cent. of young stock, although naturally there is a divergence in different districts. The minimum carrying capacity of land used for dairying is about one cow to three acres.

The Guaranteed Price Committee in its report of 1938 considered that a dairy farm is efficiently capitalized at an average of £75 per cow. This amount is said to be made up as follows:—£60 per cow for land and improvements, plus £15 for stock and implements.

Inquiries elicited the information that farms in the best dairying districts would cost £60 an acre to purchase.

The Jersey is numerically strongest among the breeds of dairy cattle, now representing about 85 per cent. of all dairy cattle. Other breeds, in order of importance, are Ayrshire, Friesian, Milking Shorthorn. The Australian Illawarra Shorthorn has not been introduced into New Zealand.

The Jersey is a larger framed animal than its Australian counterpart. Jersey herds have been largely graded up from foundation stock of milking shorthorns. Incidentally, the production of grade cows is now equal to that of pedigree stock.

Investigations on the growth rate of cows in its Jersey and Friesian herds have been carried out at Massey College, from which institution the following information on average weights was obtained:—

Age.	Friesian.	Jersey.
One year	600 lb.	400 lb.
Two years (just after calving) ..	850 lb.	600 lb.
Mature cow at calving	1,250 lb.	900 lb.

Originally the Milking Shorthorn was the leading dairy breed, but the rapid swingover to the Jersey breed is reflected in the undermentioned table:—

Breed.	1921. Per cent.	1938. Per cent.
Jersey	29·6	75·0
Shorthorn	56·0	5·6
Friesian	11·4	7·9
Ayrshire	3·0	7·8

The popularity of the Jersey is attributed to its economy of production in the New Zealand environment because of the following factors:—

1. The ability to carry a larger number of effective milking cows per unit area, because of lower body weight and hence lower maintenance requirement;
2. The higher butterfat percentage in the milk, which economises in energy requirements in food per lb. of butterfat.

It is in the intensive dairying districts of the North Island where the Jersey predominates. In the South Island other breeds are in favour.

The productivity of dairy cows was almost doubled in the period 1901-02 to 1939-40, the figures for the respective years being:—

1901-02	125 lb.
1939-40	236 lb.

The use of topdressing became firmly established about 1920 and the major factors responsible for this improvement are considered to be:—

1. Better feeding of stock through improved methods of pasture management;
2. The rapid change in breed composition of herds.

A technical subcommittee estimated the influence of different factors to be:—

	Per cent.
Better feeding	57·4
Breed change	26·2
Culling low producers	13·1
Selection	3·3

Pastures and Pasture Management.

The influence of grassland on dairy production in New Zealand has already been mentioned. Dairy farming is carried out on an intensive grassland system in contrast with the extensive pastoral dairying or arable dairying so common in Queensland. In the Waikato district, the most intensive dairying district in the Dominion, the farms vary in size from 80 acres to 150 acres. The average dairy farm of about 100 acres is capable of carrying a herd of 50 milkers, together with the necessary complement of approximately 20 other dairy stock, such as yearlings, heifers and calves.

Dairying is so dependent on grass that in the intensive dairying districts there is practically no cropping at all. The surplus pasture growth in the late spring and early summer is conserved as both hay and silage for tiding the herd through the winter period, from May to September. About one quarter to one third of the farm area is so conserved, the average yields being 8 tons of silage and 2 tons of hay to the acre. Both stack and pit silage are made, though the former kind is more common; both types are frequently made on a farm. Silage and hay making were both in progress at the time of my visit. Ensilage is usually made late in November and hay in December. It is generally considered desirable to conserve one acre of hay for carrying every three to four cows through the period of hand feeding.

Professor Riddet, Director of the Dairy Research Institute, expressed the opinion that a dairy farmer should aim to conserve 12-15 cwt. of grass hay and 2 tons of grass silage per cow yearly for feeding off in the winter.

The use of the pick-up baler and side delivery rake for haymaking is increasing and it was estimated that about 15 per cent. of hay is now baled by this means. The baling of hay is often done by contractors.

An investigation to find the loss in silage stacks disclosed the wastage to be about 25 per cent., in addition to which the loss of dry matter as a result of bacterial action amounted to approximately 30 per cent. Total losses are therefore, probably in the vicinity of 50 per cent. It is probable that about equal loss occurs in haymaking. These losses are under investigation at research institutes with a view to their reduction by developing improved methods of hay and silage-making.

The New Zealand Dairy Research Institute has carried out investigations on the use of molasses in silage-making but proved no economic benefit. The feeding value of the resulting ensilage was enhanced only by an amount equivalent to the nutriments added in the molasses.

Where any crops for supplementary feeding are grown on specialized dairy farms, chou mollier (narrow stem kale) is the main crop. Because of its relatively high protein content (15 per cent. in the dry matter), capacity to withstand a dry spell, and its high yield of up to 35 tons per acre, it is used on many farms for autumn and winter grazing. This crop is planted in October, grazed heavily in January or February, and then allowed to remain for regrowth and feeding-off in winter.

Some interest is being taken in growing pampas grass for winter feed. Opinions on its merits varied. Its nutritive value is, however, only about that of poor grass hay.

Rye grass-clover pastures predominate, although in the northernmost part of North Island paspalum is often the dominant pasture species. Cocksfoot is another common constituent of pastures, especially in the South Island.

Typical pasture seeds mixture are—

1.

20 lb. perennial ryegrass.
6 lb. Italian ryegrass.
6 lb. cocksfoot.
2 lb. red clover.
2 lb. white clover.
2 lb. Timothy grass or crested dogtail or meadow fescue.

2.

17 lb. permanent pasture biennial rye.
8 lb. Italian ryegrass.
4 lb. No. 1 white clover.
3 lb. red clover.
2 lb. prairie grass.
2 lb. paspalum (in north of North Island only).
2 lb. Akaroa cocksfoot.
2 lb. Timothy grass.

This seed (cost, £4 per acre) is sown at the rate of about 40 lb. per acre and at the time of sowing 2 to 5 cwt. superphosphate and lime of varying amounts are applied. As previously stated, on the North Island superphosphate must be replaced by serpentine superphosphate under the existing *Fertilizer Control Order*. Top-dressing practices have already been described.

Dairy farms are usually well subdivided to permit of the pastures being evenly and completely grazed in rotation, but although a strict rotational grazing system is pursued successfully on many farms, they are apparently in the minority.

Higher carrying capacity and average production were noted on the farms of progressive pasture-conscious farmers visited. On such properties, the pastures are completely eaten off at their maximum nutritive stage of 6 inches to 8 inches high by concentrating the milkers at the rate of up to twenty cows per acre during grazing-off for, say, twenty-four hours in each paddock. The paddocks are refertilized with the dung voided and the even rainfall ensures quick recovery of the pastures. The individual paddocks on a closely subdivided farm may be only 3 acres in area. If the grass gets away from the cows during the flush growth the mower is used for pasture control.

Farms on which the principles of grassland rotation are well applied have average productions of up to 400 lb. per cow and 250 lb. per acre, entirely off grass.

The electric fence is used to some extent for temporary fencing in subdivision of paddocks for rotational grazing and the feeding-off of chou mollier in "breaks." In the experience of some, the electrically charged fence is unsuitable for permanent use, as bulls and cows in season will break through and in the flush grass season short circuits occur.

The Fresh, Green "Bite."

A method of utilizing the young "bite" of grass in the winter as a protein concentrate to supplement the low protein silage and hay then fed was demonstrated by Professor Riddet at the Massey Agricultural College. Preferably, paddocks with a wide face (not a long, narrow paddock) are used. The sward is grazed bare in March or April and shut up until it is grazed again from June to August. When feeding off commences, an electric fence is put across the paddock about 1 chain in depth. The stock (up to forty) are turned in to the wide, shallow area and completely graze it down. Next day the hay and silage are put out on the area grazed the day before, the electric fence removed back another chain, and the cows turned into the paddock. They first eat the hay and silage and then the young grass in the new area available for grazing. One quarter-acre of grass is allowed per cow per month in full milk. If, therefore, three paddocks are to be shut up for this purpose and grazing will extend over three months, three-quarters of an acre is needed per cow. Since the stocking rate is heavy and 90 per cent. of the constituents of the feed are voided in the dung and thus returned to the soil, the method assists not only in the better nutrition of the stock but in the refertilization of the paddock. This system seems worthy of trial in the coastal paspalum pasture districts of Queensland. The paddocks used would need to be mowed, or preferably grazed, late in the summer or early autumn, shut up from May to July, and grazed in August and September. The grass would not become fibrous and could be allowed to grow up to 12 inches high, but not higher.

Investigations on the feeding of dairy stock entirely off grass or its products, hay and silage, have demonstrated that well-managed, rotationally grazed pastures supply adequate nutrients for the maintenance and milk production of dairy cattle in commercial herds. Thus, the feeding of concentrates is not economically justifiable on well-managed dairy farms in New Zealand. A further factor militating against the use of concentrates is the high cost of grains and protein-rich foodstuffs in the Dominion.

Lucerne is grown for feeding to dairy stock only in the areas of lesser rainfall. In the high rainfall districts with their assured pasture growth it was rarely seen.

Herd Management.

Pedigree bulls are used, it is said, on 80 per cent. of farms. Furthermore, 75 per cent. of all bulls are estimated to be of the Jersey breed. There is a growing appreciation of the importance of the sire in herd improvement. On progressive farms visited the bulls were not allowed to roam with the herd, but were confined to bull paddocks in order to control their services. One bull is kept for every 30-35 cows in the herd. Yearling bulls are allowed to serve up to twenty cows.

The annual bull sales, held just before the season commences, are a characteristic of the dairy industry in New Zealand. One herd improvement association, which tests 100,000 cows yearly, also operates a bull procuration service through which buyers and sellers among its members may be brought into contact.

Dehorning of dairy herds is practised widely, the treatment being mainly carried out by the caustic potash method in the first few weeks of the calf's life.

It is the usual practice to rear all female herd replacements on the farm, calves amounting to 20 per cent. of the herd being retained each season. Calves not needed for the herd are disposed of as bobby calves, and, through an efficient organisation built up in recent years for the collection of the calves, this trade now treats 1,000,000 calves annually. The Dairy Board controls the scheme, but the actual treatment of the calves is done at the various freezing works. All vells are supplied by the freezing works to the New Zealand Co-op. Rennet Co. at Eltham, which produces rennet for all New Zealand cheese factories. The factory of the rennet company, besides rennet, now manufactures cheese colour, processed cheese and silver nitrate.

Calf Rearing.

Calf rearing is on a simple system, the calves mainly being fed on separated milk and pasture. Calf meals are not used to any appreciable extent and, in any case, are not needed if rotationally grazed young pastures are available to supplement the skim milk. The calf is weaned at about four and a-half months.

It is usual for Jersey heifers to calve down for their first lactation at two years of age, and the heifers of larger breeds about six months older. Sterility, even amongst first calvers, seems to be a problem of some magnitude. This differs from Queensland experience, which is that sterility in heifers is not a major problem.

Although the orthodox method of drying off cows by intermittent milking is still in general practice, it was ascertained that the herds on research stations and on some farms are dried off simply by ceasing milking when the daily yield has declined to one gallon. No adverse effect on health or production in the subsequent lactation ensues.

Pig Raising.

Pig raising is carried on in conjunction with dairying and, as with calves, the pigs are chiefly dependent on separated milk and pasture. As cereals are not grown extensively in New Zealand, their use in pig raising is limited: they are usually in short supply and too costly for this purpose. Electrically operated skim milk pumps are widely used for pumping separated milk from the dairy shed to the piggery.

[TO BE CONTINUED.]

TO SUBSCRIBERS.

Please renew your subscription without delay. Write your full name plainly, preferably in block letters.

Address your subscription to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Low Butter Content of Late Winter Milk.

During the late winter and early spring, milk from many suppliers received at the milk depots is below the standard butterfat test of 3·3 per cent.

The following suggestions are offered to assist producers to raise the butterfat content of their milk:—

1. Regulate your milking times so that intervals between milkings are as equal as possible (e.g., not more than 14 hours between evening's and morning's milkings, and not less than 10 hours between morning's and evening's.)

2. Heaviest yielding cows should be milked last in the evening and first in the morning.

3. When the intervals between milkings are uneven, strip thoroughly in the mornings only. Include the strippings in the milk supply.

4. In view of the fact that milk contains the lowest percentage of fat during the first two to three months after calving, it is advisable to regulate calvings to avoid having too many cows freshening at the one time.

5. Discard the first drawn milk. This milk is very low in butterfat, and is also heavily contaminated with bacteria.

6. Cattle should be fed with concentrates, if procurable, when pastures are inadequate for full feeding, as the composition of milk is affected if the cows are under-nourished.

7. Test cows for butterfat and if milk is retained for calf or pig feeding, utilize milk from the lowest testing cows. Replace low testing cows as opportunity presents itself.

—S. E. Pegg and C. R. Tummon, Division of Dairying.

Plate 56.

A NAVY BEAN CROP NEAR MEMERAMBI, SOUTH BURNETT.

ANIMAL HEALTH

Contagious Bovine Pleuro-Pneumonia.

C. R. MULHEARN, Divisional Veterinary Officer.

CONTAGIOUS bovine pleuro-pneumonia, commonly known as "pleuro," is a highly infectious disease of cattle affecting the lungs and chest cavity. It is caused by a minute germ which is present in the "virus" and certain organs in natural cases of the disease. This germ is used in the preparation of vaccines for inoculation purposes.

The disease can only be spread by contact or the mixing of diseased with healthy cattle. The infective material or germs are passed out from the lungs of a sick animal and they are taken into the lungs of susceptible animals in the act of breathing, become established in the lung tissue and set up new cases of the disease. It is therefore easy to understand how one diseased animal when introduced into a healthy mob can rapidly give rise to a serious outbreak of the disease.

All types and ages of cattle are susceptible, but generally the most severe outbreaks are encountered in travelling stock when their natural resistance is lowered because of exposure to unusually severe conditions. Experimental cases have been produced in sheep and goats, although there is no record of the disease in these animals under natural conditions.

Symptoms.

The susceptibility of individual animals varies, and generally most affected animals show obvious evidence of sickness; however, occasional cases may pass through a mild attack of the disease without showing noticeable symptoms.

In travelling cattle one of the first signs of the disease is an inclination of the affected animals to drop to the rear of the mob, whilst with dairy cattle there is a marked falling off of the milk supply. If temperatures were taken at this stage they would be found to be abnormally high, ranging from 103 to 106 degrees.

The sick animals seek the shade and show evidence of thirst. The appetite is diminished and cudding is restrained and eventually ceases. The coat becomes ruffled, the ears drop, and the beast has a generally dejected appearance. Intermittent coughing may be noticed, and this is particularly evident after exertion.

A common method of detecting the disease is to race the suspected animals around for a few minutes, when the positive cases show fits of coughing. This, of course, is not diagnostic of contagious pleuro-pnuemonia, but it is a useful method of picking out suspicious animals for closer observation. As the disease advances the respirations become quickened and a normally docile animal, when disturbed, will often charge the attendants. At a later stage the animal stands with its head extended, its forelegs wide apart, its back arched, and its flanks heaving owing to respiratory distress. In fatal cases death usually follows in from four to seven days after the onset of obvious symptoms. In cases that recover the animal gradually regains a normal appearance and recommences feeding, but it will cough following exertion during the convalescent period.

Post-mortem Findings.

The most noticeable changes in the dead animal are associated with the lungs and surrounding tissues. On opening up the chest cavity a quantity of fluid commonly known as the "virus" may be found therein. The virus may vary in amount from less than a cupful to 1 gallon or more. It also varies in colour from a clear amber to that of a port wine. The darker colours are usually due to the presence of blood. The fluid may be quite clear or it may be slightly turbid, and it usually contains jelly-like masses. The name "dry pleuro" is sometimes applied to those cases in which very little virus is present, and some stockmen consider it is a different disease. However, this is a fallacy, as there is only one contagious pleuro-pneumonia.

The lungs are usually found attached in various places to the chest wall, and both the covering of the lungs and the lining of the chest wall are considerably thickened. Portion of the wall of one or both lungs may be involved. On inspection it will be found that the diseased portion of the lung is considerably swollen and much firmer than normal. In consistence it resembles liver rather than lung tissues. The cut surface of the lung in most cases presents a typical picture, and it somewhat resembles a piece of marble, the veins being of a whitish colour and formed by the greatly thickened connective tissue which separates the reddened areas of lung issue. The degree of marbling may vary, being more noticeable in some cases than in others, but in all cases there is some thickening of the connective tissue which separates the areas of diseased lung. In the typical cases a small quantity of virus frequently flows from the cut surface of the lungs. The mediastinal and bronchial lymphatic glands (between the two lungs) are often enlarged, and may show pronounced changes.

The Carrier Problem.

Contagious pleuro-pneumonia is a highly fatal disease and in some outbreaks a large percentage of the susceptible cattle become affected, with up to 50 per cent. mortality. In every outbreak a certain number of the affected animals recover, and undoubtedly a large number of these retain diseased tissue within their lungs, although to outward appearances they look perfectly healthy. These animals are known as "carriers" and they are responsible for fresh outbreaks often widely separated from the centres in which they originally contracted the disease. Under normal circumstances the carriers may remain healthy, for the diseased tissue is encapsuled, but conditions such as starvation, overdriving, &c., lower their resistance and the disease may reassert itself. It is for this reason that outbreaks are frequently encountered in travelling stock. The relapsing animal may not suffer from a severe attack of the disease—it may not even be detected as being diseased—but it passes the germs from its lungs to the exterior and so acts as a constant source of infection to the surrounding animals.

The disease is constantly present on many of the large cattle stations of Northern Australia, and unfortunately it is impossible to eradicate it from these areas. Consequently, each year numbers of apparently healthy animals, which are carriers, are moved into the more closely settled areas and they are responsible for fresh outbreaks from time to time. If all the infected animals and carriers could be detected and destroyed the disease could be eradicated from Australia, as it has been from other countries, within a few years. However, this is not possible under the present grazing conditions of the large cattle stations, but the elimination of carriers will play a very important part in the control of the disease in the more closely populated areas of Queensland. It is now possible to detect carriers by means of a blood test and this test is being used to eradicate the disease following outbreaks in dairy herds.

Prevention and Control.

It is generally unwise to consider treatment of diseased animals unless they are very valuable, for there is always a risk that when they recover they may become "carriers" and be responsible for a serious outbreak of the disease at some later date. Recovered animals should be sent for slaughter at the first opportunity.

If the value of a recovered animal warrants its retention for breeding or any other special purpose it should be held in isolation until it has been blood-tested and proved to be free of the disease. If the blood test indicates that the animal is a "carrier" it should not be retained under any circumstances, as it would be a potential source of infection to other animals in the herd.

The most satisfactory methods of dealing with an outbreak of "pleuro" are to destroy the diseased animals and to keep the "in-contact" animals well under control. All "in-contact" animals should be inoculated to give them an immunity so that no fresh cases, other than those already infected, will occur. As the period of incubation, or the latent period between infection and obvious symptoms, is considerable and may vary from a week to two months or more, a large number of animals may have become infected and be incubating the disease before the outbreak is discovered and inoculation is carried out. It is for this reason that a number of cases occur for a varying period following successful inoculation, and consequently it is necessary to hold "in-contact" animals in quarantine for long periods to ensure that all the latent cases will be detected before the suspected animals are released from quarantine. Under normal circumstances an outbreak cleans up in from two to four weeks after inoculation.

Preventive inoculation is also carried out amongst healthy animals to render them resistant in case they are exposed to infection. This is a very wise procedure and is carried out as a normal routine practice when cattle are mustered for branding on several North Queensland properties.

The inoculation of travelling store cattle immediately prior to commencement of movement is now looked upon as a normal and necessary procedure. The extension of air services to the cattle-breeding country of North and North-western Queensland has greatly assisted the distribution of contagious pleuro-pneumonia vaccine for this purpose. Very few mobs of cattle are now travelled from these areas without being inoculated and outbreaks of "pleuro" in these mobs are seldom recorded.

Methods of Inoculation.

Inoculation as practised in Queensland consists of introducing a small quantity of vaccine containing "pleuro" germs under the skin towards the tip of the tail. When this is carried out a mild reaction is produced at the site of inoculation, and the animal gains a resistance to the disease. The area towards the tip of the tail is selected for inoculation because it is far removed from the centre of circulation and because if the local lesion following inoculation becomes extensive it can be controlled by cutting off the tail. If inoculation were carried out on other parts of the body the lesions could not be controlled and they would spread extensively, causing heavy losses.

A vaccine for contagious pleuro-pneumonia inoculation has been evolved by the Council for Scientific and Industrial Research and this product has been widely tested and has given good results. More than two million doses of this vaccine have been distributed by the Department of Agriculture and Stock and used for the inoculation of Queensland cattle during the past 10 years and it has given very satisfactory results.

The fluid which collects in the chest cavity in active cases of the disease and which is known as "natural virus" is still occasionally used for inoculation. This fluid gives good results when used in the fresh state—that is, when it is only a few days old—but its keeping qualities are uncertain and it should not be used after it has been stored for long periods. It is also essential to ensure that the animal from which this "natural virus" was obtained was otherwise healthy, for it is possible to transmit diseases such as tuberculosis to the animal being inoculated if the virus is contaminated with tubercle germs.

For these and other reasons natural virus is not as satisfactory as the specially prepared vaccine and it is unwise to use it when the vaccine is available. Contagious pleuro-pneumonia vaccine can be obtained from the Animal Health Stations at Yeerongpilly and Oonoonba.

The most satisfactory method of inoculation is to inject one-fifth of a cubic centimetre (that is, three to five drops of vaccine) under the skin about one inch above the tip of the tail. A special syringe of 1 to 2 c.c. capacity, preferably with an adjusting screw on the plunger, is most suitable for this purpose. Special strong 19-gauge hypodermic needles are also required. This equipment is in short supply at the present time but it should become readily available in the near future.

Another method of inoculation is the seton method, which consists of introducing a piece of wool, saturated with vaccine, under the skin of the tail. Special needles are required for this purpose. A third method consists of introducing the vaccine by means of a special spoon-shaped needle.

The syringe method of inoculation has advantages over the other methods in that it is easier and quicker to carry out, an exact amount of vaccine can be delivered under the skin and there is less injury to the tissues. However, no matter what method is used it is essential to practise strict cleanliness in carrying out the operation.

It is the usual practice to bang-tail animals immediately after the operation to indicate that they have been inoculated. Under normal circumstances a mild reaction occurs at the site of inoculation about four to six days after the inoculation is carried out. This consists of a slight swelling and thickening, which usually extends a few inches up from the tip of the tail. Sometimes an excessively severe reaction occurs in from seven days to a month after inoculation and this reaction is usually referred to as a "bad tail."

The vaccine is specially standardized to give as strong and lasting immunity as is possible without causing a severe local reaction in the tail. However, the resistance of the animal to the inoculation varies and occasionally a severe reaction may result. A limited number of severe reactions—for example, one or two per 1,000 head—should be looked upon favourably, as it indicates that the vaccine is potent.

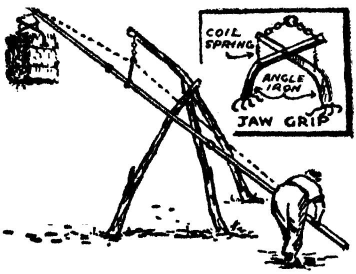
Another form of "bad tail" is encountered, particularly when contaminated natural virus or dirty methods are used. In such cases foreign germs are introduced at the time of the inoculation and the tail becomes "pussy" and putrid and it may drop off. In any such cases tails should be amputated.

The inoculation gives a solid immunity in the majority of animals treated, but on some occasions this may be broken down and a few cases of the disease may occur. If, however, the inoculation has been successful it will prevent the disease spreading through the mob. The immunity takes about two weeks to develop and usually lasts about 12 months, therefore it is advisable to inoculate animals which may be exposed to infection at least once a year.

A SIMPLE HOME-MADE HOIST FOR BALE HANDLING.

Hay and straw are being baled more and more on many farms as this method of fodder conservation not only assists storage, but greatly assists the proper proportioning of food to stock, etc.

In many cases, the stacking of baled hay and straw may have its difficulties, especially if labour is a bit short, but this simple device should be of assistance as it is a simple but effective method of handling the bales. The loading tool is also quite a good one, simply constructed and easily made to serve its purpose.



The device consists of a 24 ft. length of 1½ in. piping or other material, swinging from a suitable point as shown in the sketch. In this instance, strap-iron is used, suspended from a pole or tripod as indicated.

The piping is strengthened by a chain supporting each end on the cantilever principle. Into one end is fitted a short length of 1 in. piping to form a handle grip.

To the other end is attached a jaw grip for holding the bales.

This consists of two pieces of angle-iron loosely bolted together and cranked towards one another at their lower ends, to which are attached the working ends of two old dung forks with the tynes bent inwards.

Two coiled springs, attached from the end of each angle-iron to the bend of its opposite keep the jaws open. A small amount of pressure enables them to be closed into the bale, and the weight of the bale when suspended keeps them in position. A jerk on unloading is usually sufficient to make the springs open the jaws.

—*From "Handy Farm and Home Devices and How to Make Them."*
(*T. V. Bartlett for War Blinded Association, Adelaide, S.A.*), 1946.

The Brisbane Exhibition.

IN spite of severe seasonal adversity, the 1946 Brisbane Show attained a record in attendance if not in farming exhibits, and in the livestock sections quality grades were at least equal to those achieved in pre-war years. The beef and dairy cattle particularly provided impressive evidence of the brains which go into the breeding of such fine animals.

This year's Show was further proof of the high standards Queensland farmers and stockowners generally have reached in every branch of their respective industries. Whether it was in the splendid stock paraded for judgment or in the quality of the district exhibits—the prolonged dry weather had, unfortunately, limited pavilion representations—the results of science and practice were made manifest. In the manufactured and processed exhibits was also seen how closely and strongly country and town are linked in interest and in industry.

THE COURT OF AGRICULTURE.

Among the big pavilion displays was that contained in the Court of Agriculture of the Department of Agriculture and Stock. In every section of this display it was shown that the application of technical knowledge to farm practice is more necessary now than ever it has been, and how trained and experienced men are available to assist those engaged in every branch of rural industry in Queensland. Quality in every farm activity, quality in every product, raw or manufactured, will strengthen our hold on export markets—that was the lesson demonstrated so convincingly in the Court of Agriculture.

The Division of Plant Industry in a mosaic of seed in contrasting colours told the story of the productivity of our great grain lands. Cotton in boll and bale, tobacco in golden leaf and an array of other field products illustrated the importance of them all in our rural and urban economy.

Soil conservation methods were demonstrated in well-set-up landscape models which presented in sequence creation, exploitation, devastation and conservation as an effective object lesson on the causes of erosion and how the principles of soil management can be applied. Correct cultivation as a measure of prevention of the wearing away of land by wind and water was the theme, and the scale models were there to exemplify how it is done.

There were also models of pit, trench, tower and hillside silos, made to scale, to illustrate modern means and methods of stock food storage. In no district are grazing conditions constantly good, and when pastures dry off silage will provide the succulent feed to keep the milk tide high in the dairy shed. Silage has no insect or rodent enemy and will keep indefinitely.

In another part of the Court there were sheaves of useful grasses, both native and introduced, and rows of potted poisonous plant to demonstrate many grazing hazards.

Bananas of many varieties were among the chief exhibits of the Horticulture Branch and they included Mons, Ceylon, Finger, Sugar, Blue Java, Ducassis, Cavendish and some hybrids. There also was a contrast in banana packing cases—the new short case and the familiar longer box. For the shorter case, it is contended that it is lighter and easier to handle for transport, is less liable to damage in transit, and, by its use, ''squirter'' and associated troubles are less likely to develop in southern consignments.

The main idea of the Chemical Laboratory was expressed in samples of soil types with varying degrees of fertility value. Examples of fluorosis in water, causing mottled teeth and permanent damage and abnormal bone formation, were also included in a highly educational exhibit.

There can be no let-up in the war against vegetable pests and diseases, as was demonstrated by the Science Branch in its display of its laboratory and field activities. The effectiveness of new insecticides, including D.D.T., in various fields of use was illustrated, showing that science is alert and on guard against insect and unseen enemies.

The theme of the display by the Animal Industry Division was stock diseases from diagnosis to cure. Queensland is one of the healthiest stock countries in the world, but parasites and other pests can and do take a heavy toll of our flocks and herds. Knowing a cause, measures of prevention can be devised and this section of the Court conveyed the message of applied veterinary science.

The departmental wool exhibit this year was made up largely of fine and medium-strong fleeces from Bowen Downs. In one other row the effects of copper deficiency in pastures were shown as evidence of the importance of mineral sufficiency in our pastoral country. As set out in the agricultural chemistry section, mineral deficiency in pastures is a very serious matter. For instance, if there is not enough calcium and phosphorus in their food animals may take to bone chewing or develop rickets or other disorders.

Both the Pig and Poultry Branches were represented in model and in maxim. Well planned farm layouts complete with accommodation and equipment were displayed as guides to effective farm design.

In the display of the Division of Dairying, the nutritive value of milk and its derivatives was demonstrated by comparison with other foods. Pyramids of processed products proved that there is wealth as well as health in the dairy industry.

The Division of Marketing had a section with samples of grower-controlled commodities within the scope of primary producers' organization and co-operative legislation, illuminated with facts and figures relating to the economic side of agriculture.

As a whole, the Brisbane Show yielded abundant evidence of the energy, enterprise, skill, ability and organizing capacity of the people who are doing the real work of the nation.

Plate 57.

THE GOVERNOR-GENERAL (HIS ROYAL HIGHNESS THE DUKE OF GLOUCESTER) OPENING THE 1946 BRISBANE EXHIBITION.

Plate 58.

THE BRISBANE SHOW.—Section of the Grand Parade.

Plate 59.

AT THE BRISBANE SHOW.—T.R.H. the Duke and Duchess of Gloucester (right) and H.E. the Lieutenant-Governor the Hon. F. A. Cooper and Mrs. Cooper, and Senator the Hon. J. S. Collings.

ORGANISED MARKETING
THROUGH
PRODUCER-CONTROLLED COMMODITY BOARDS
Ginger
SERVES BOTH GROWER & CONS

Plate 60.

THE ECONOMICS OF AGRICULTURE ILLUSTRATED.—Telling Facts and Figures were presented by the Division of Marketing.

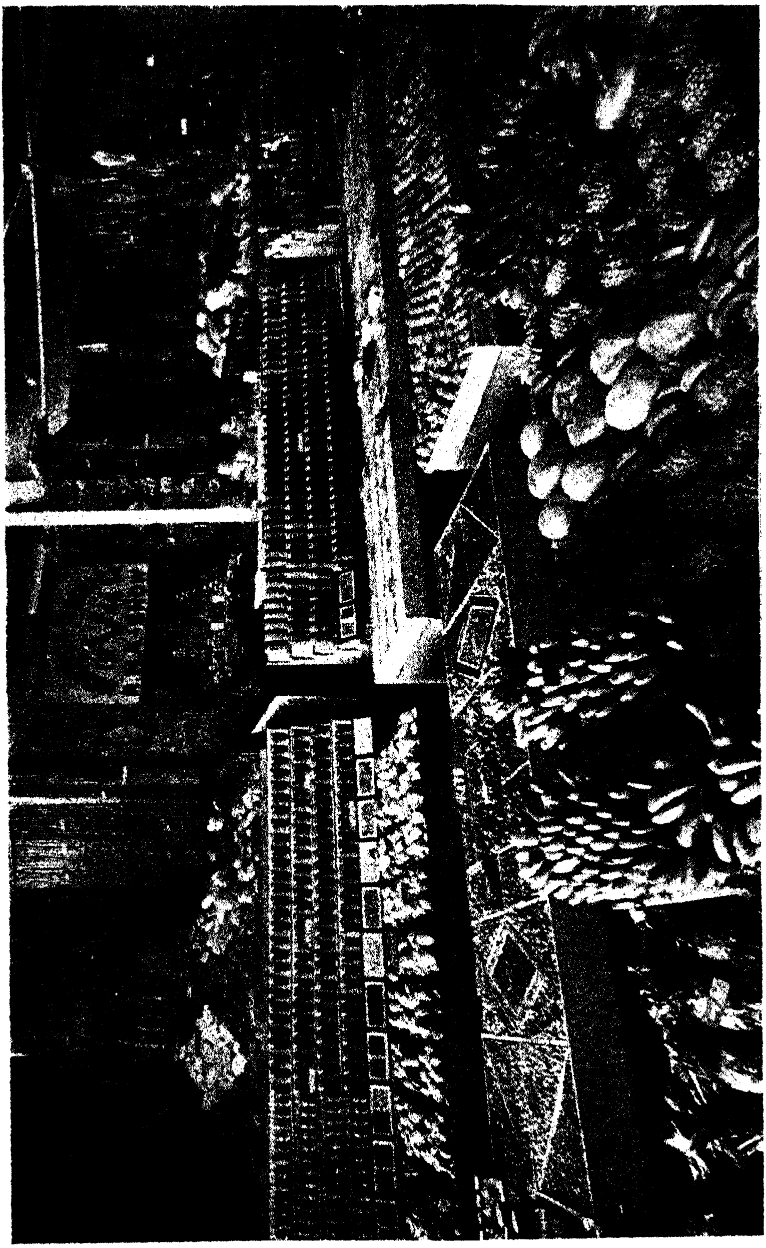


Plate 61.

THE MORETON DISTRICT'S FINE WINNING DISPLAY.

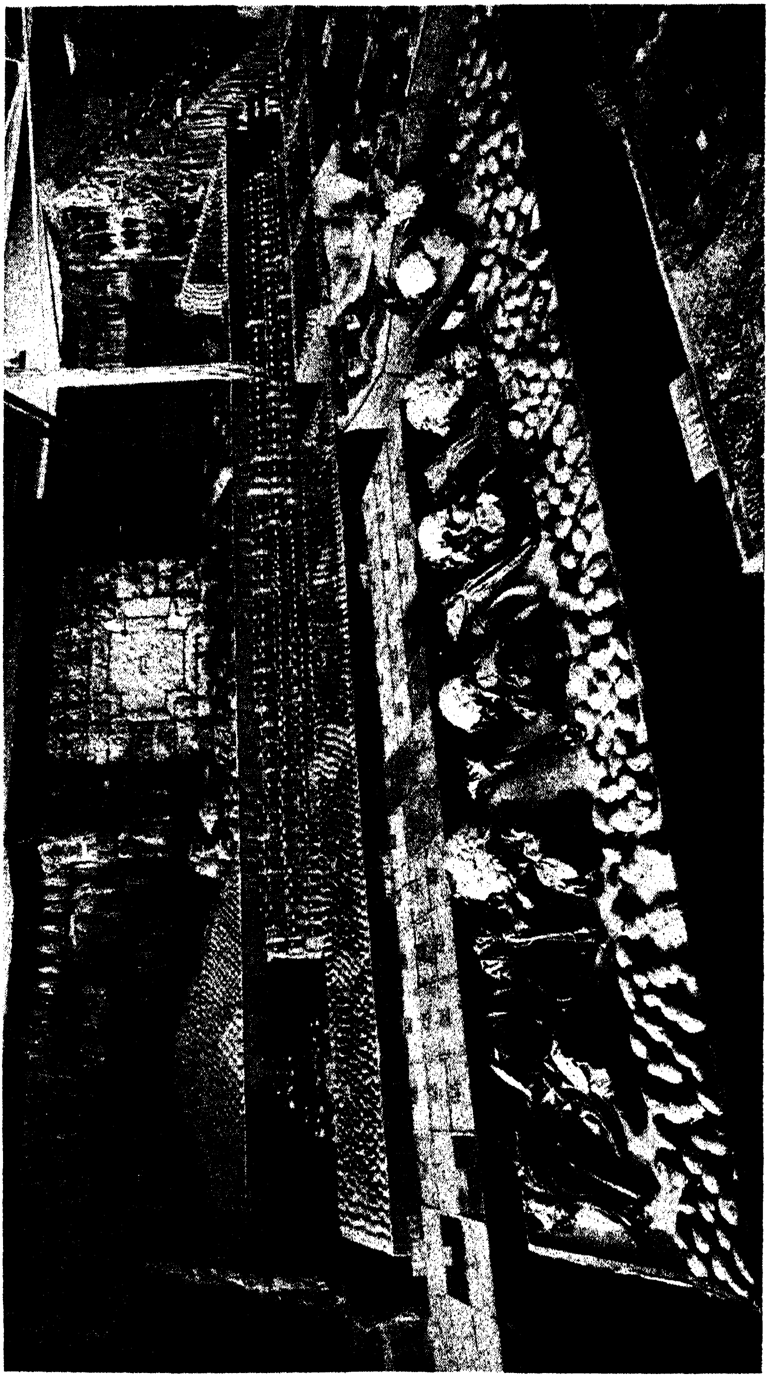


Plate 62.
THE DARLING DOWNS DISTRICT EXHIBIT.

Plate 63.

Fruits from the Coastal Country in Colourful Contrast.

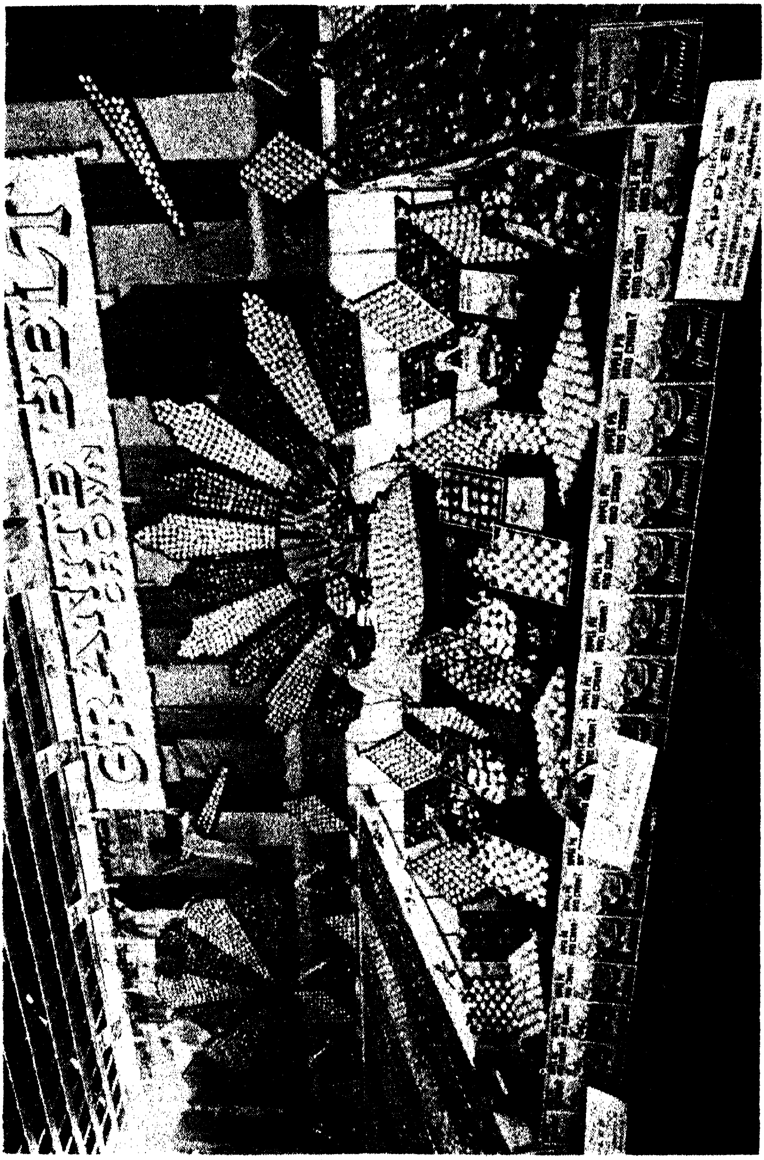


Plate 64.

PRODUCTS OF THE FRUITFUL GRANITE BELT.—The Stanthorpe Exhibit.

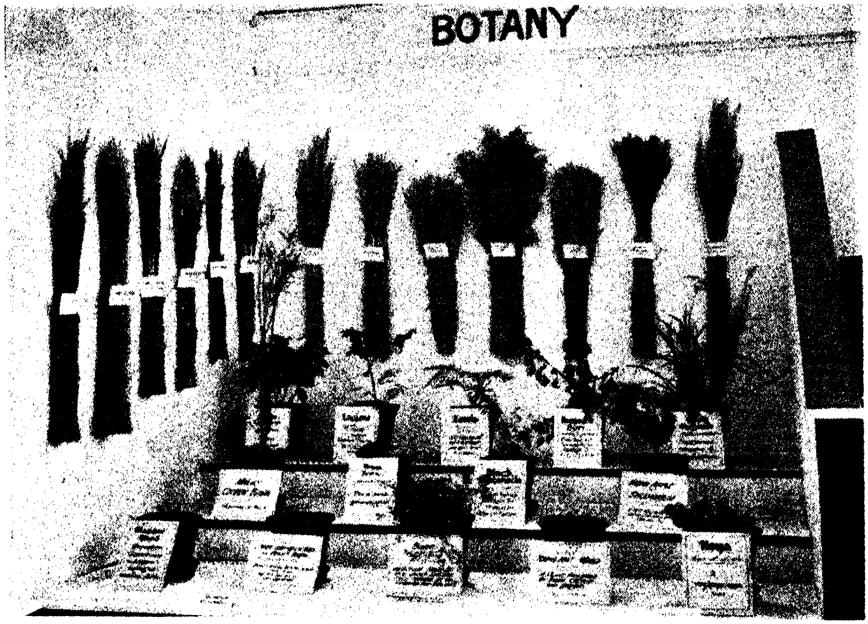


Plate 65.

NUTRITIOUS GRASSES AND NOXIOUS PLANTS IN CONTRAST IN A CORNER OF THE DEPARTMENTAL COURT.

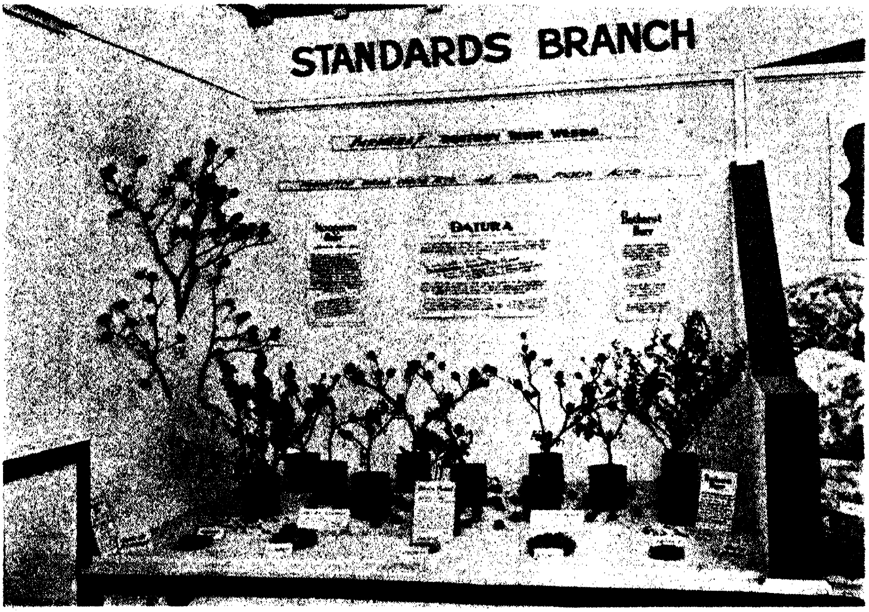


Plate 66.

HOW THE FARMER IS PROTECTED BY THE MAINTENANCE OF STANDARDS OF PURITY IN FARM CROP SEEDS WAS SHOWN IN THIS EXHIBIT BY THE STANDARDS BRANCH OF THE DIVISION OF MARKETING, WHICH ALSO ENSURES THAT FERTILIZERS, PEST DESTROYERS, VETERINARY MEDICINES AND STOCK FOODS ARE TRUE TO LABEL IN ACCORDANCE WITH QUALITY TESTS.

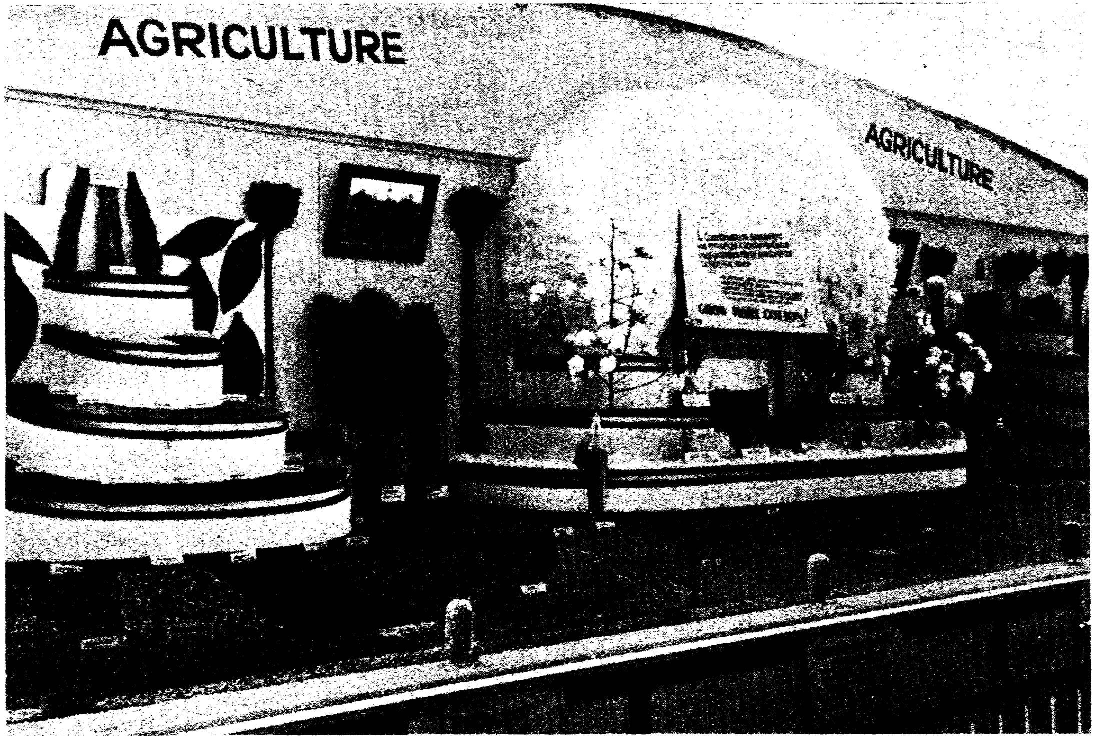


Plate 67.

A MOSAIC OF CEREAL SEEDS IN CONTRASTING COLOURS TOLD THE STORY OF THE PRODUCTIVITY OF GREAT GRAIN LANDS, WHILE COTTON IN BOLL AND BALE, TOBACCO IN GOLDEN LEAF AND AN ARRAY OF OTHER EXAMPLES OF FARM YIELD AND FERTILITY ILLUSTRATED THE IMPORTANCE OF THEM ALL IN QUEENSLAND'S RURAL ECONOMY.

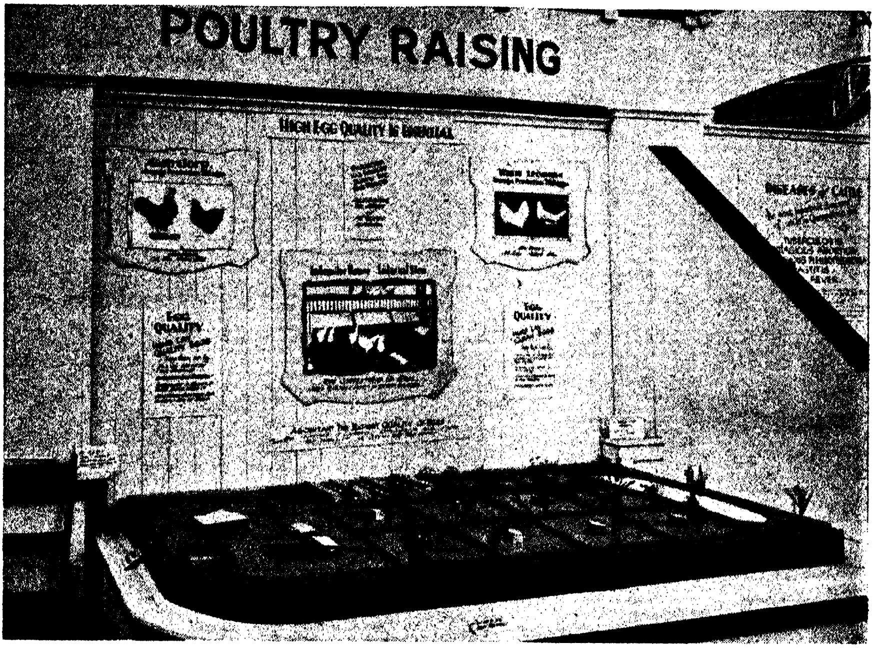


Plate 68.

A MODEL POULTRY FARM LAYOUT ATTRACTED ATTENTION TO THIS SECTION OF THE DEPARTMENTAL COURT.

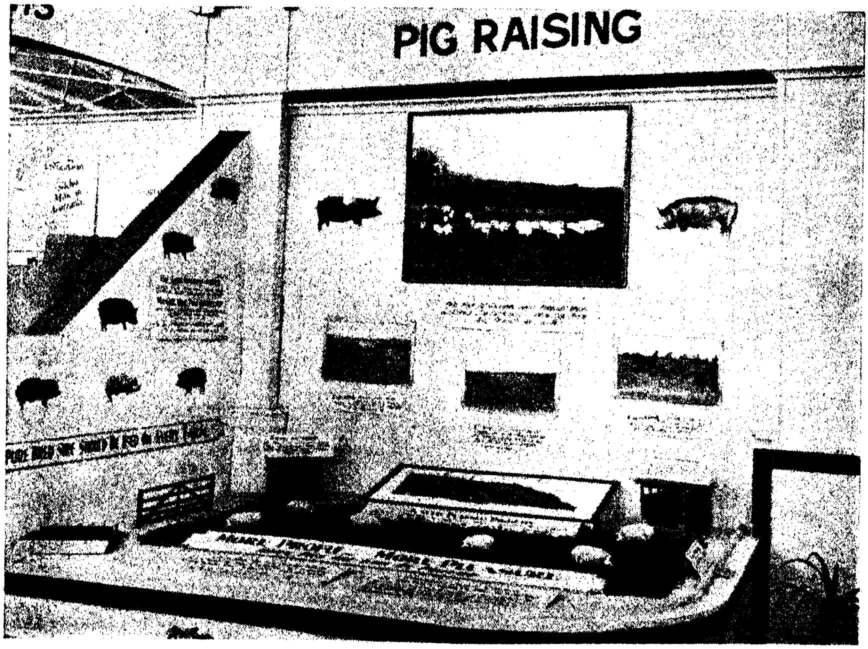


Plate 69.

POINTS IN PIGGERY MANAGEMENT WERE FITLY ILLUSTRATED.

Plate 70.

FRUIT DISPLAY IN THE DEPARTMENTAL COURT.—Banana varieties represented included Mons, Ceylon, Finger, Sugar, Blue Java, Ducassis, and Cavendish. There was also a contrast in cases—the new short case and the familiar longer box.

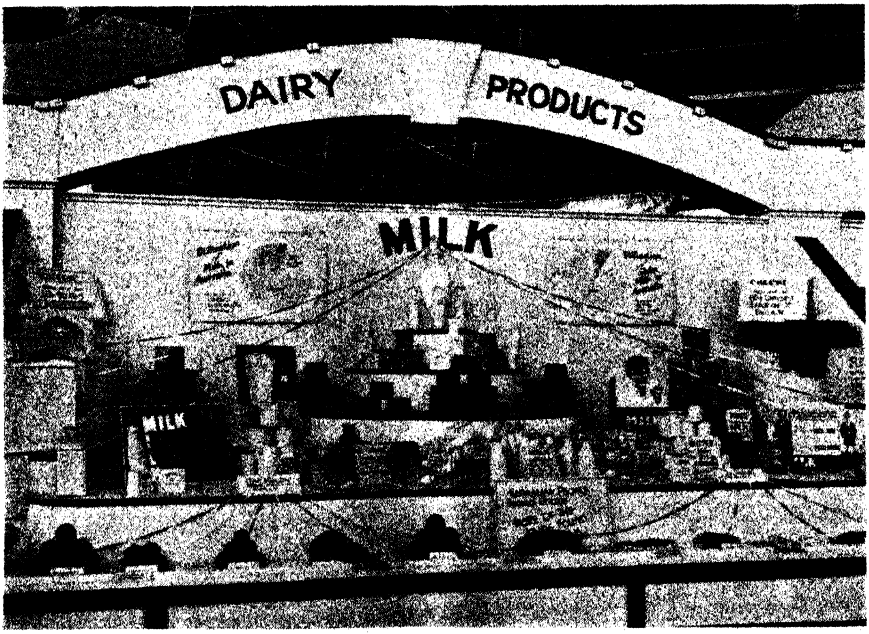


Plate 71.

THE NUTRITIVE VALUE OF MILK PRODUCTS WAS THE CENTRAL THEME OF THIS DISPLAY BY THE DIVISION OF DAIRYING.

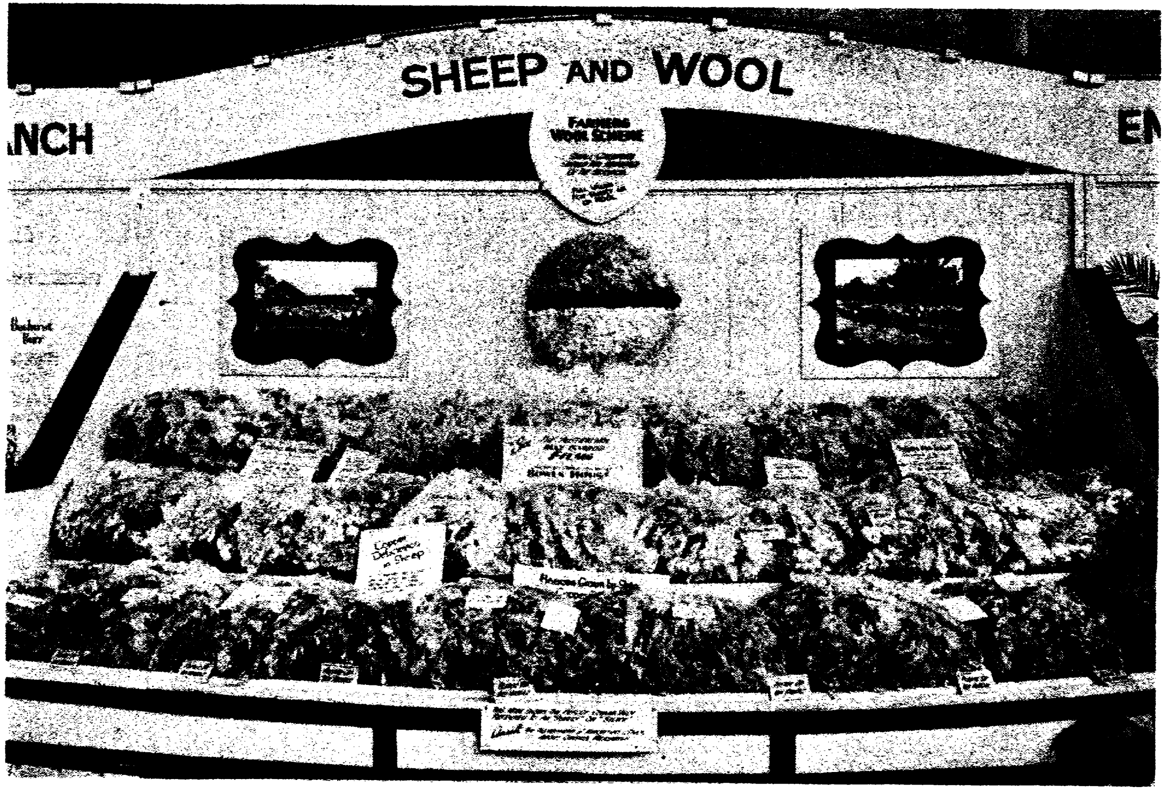


Plate 72.

A Representation of the Wool Wealth of the West.—This display was made up largely of fine and medium-strong fleeces from Bowen Downs. In one row the effects of copper deficiency were shown, illustrating the importance of mineral sufficiency in pastures.

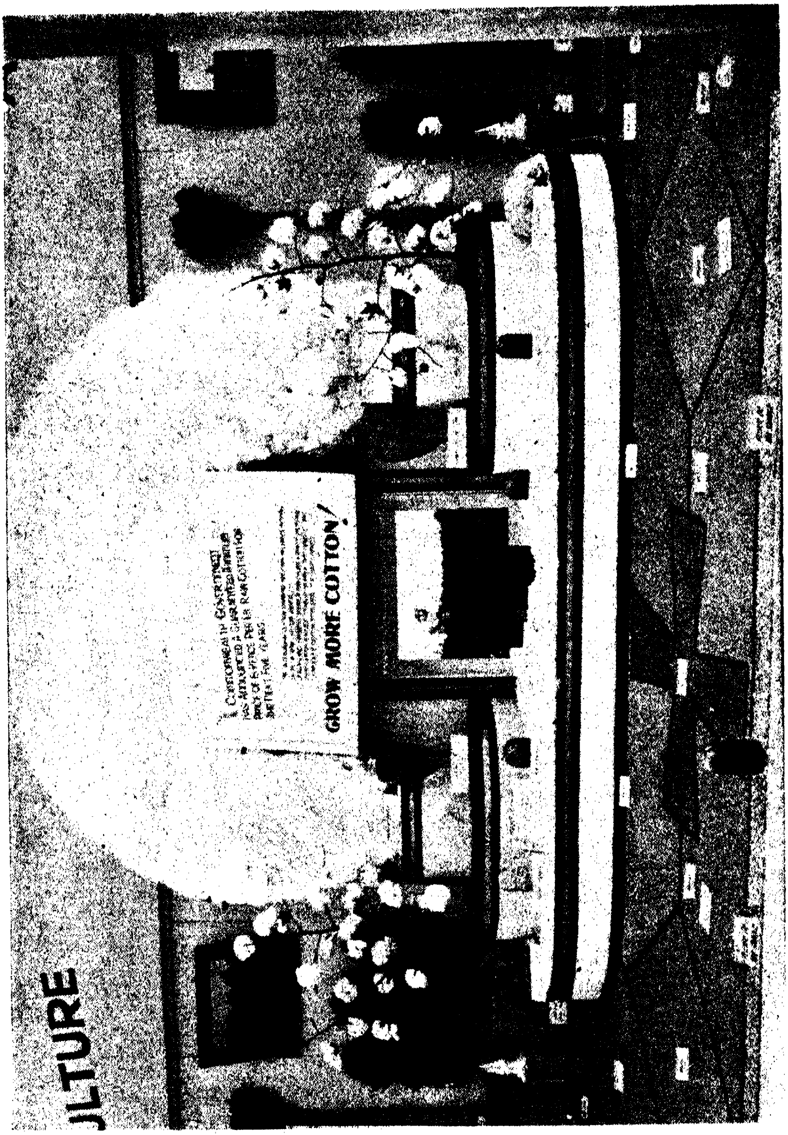


Plate 73.

CENTRAL FEATURE IN THE COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK, BRISBANE SHOW.

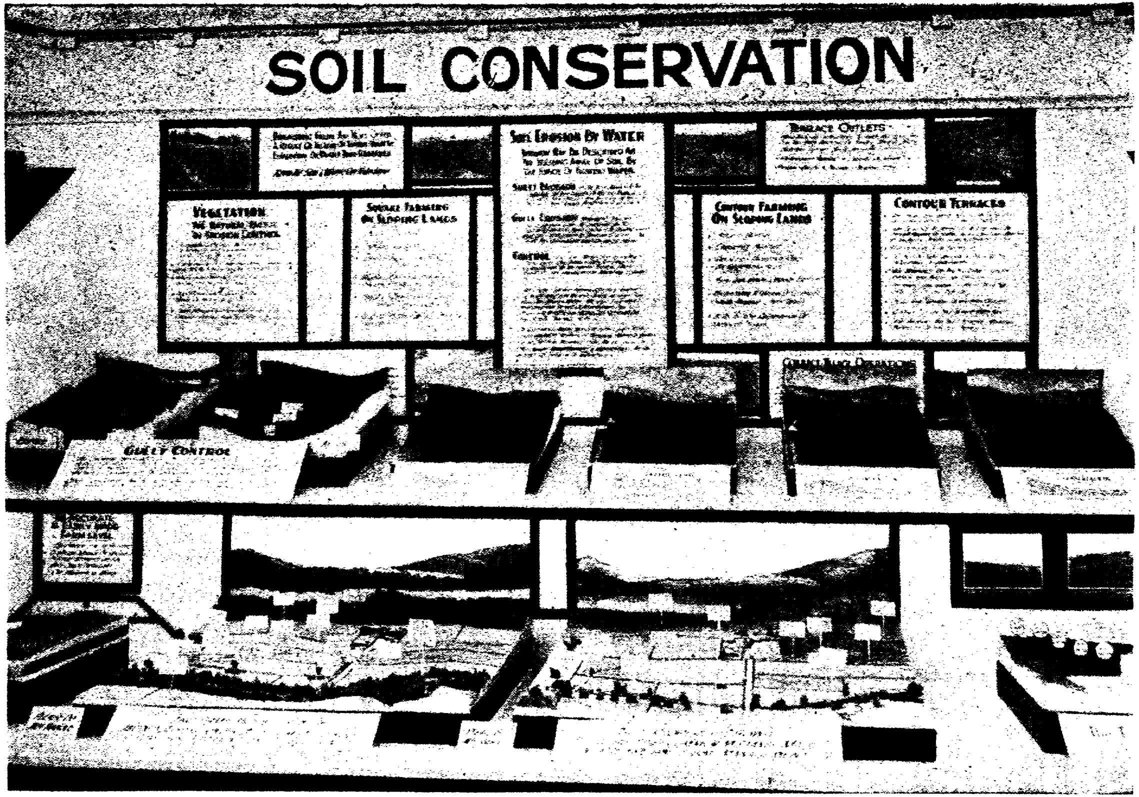


Plate 74.

SOIL CONSERVATION METHODS WERE DEMONSTRATED WITH A GROUP OF LANDSCAPE MODELS IN THE COURT OF AGRICULTURE.

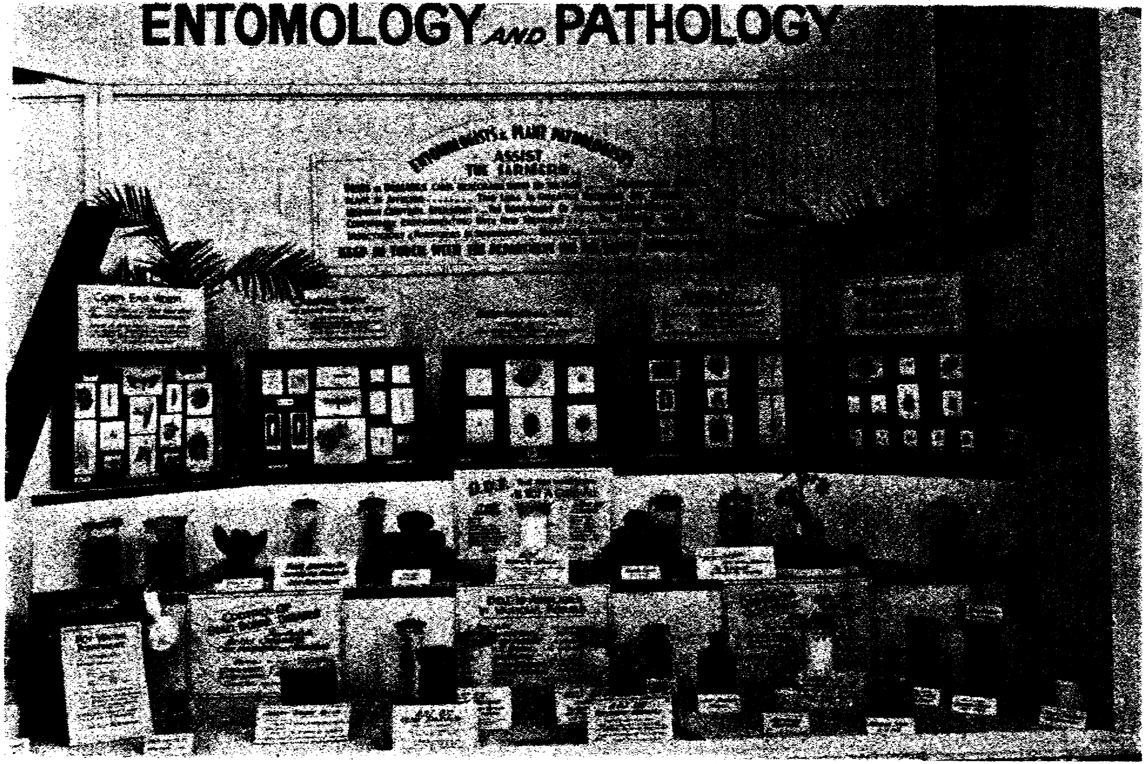


Plate 75.

HOW SCIENCE ASSISTS AGRICULTURE BY THE CONTROL AND TREATMENT OF VEGETABLE PESTS AND DISEASES WAS THE TEXT OF THIS DISPLAY BY THE SCIENCE BRANCH OF THE DIVISION OF PLANT INDUSTRY.

FODDER CONSERVATION
Some Advantages of Silage
Fodder Conservation
Have You a Silo?
Silage Fed Alone Does Not Constitute a Balanced Ration

Plate 76.

FODDER CONSERVATION.—Modern practice in stock food storage was the lesson of this display, which included scale models of tower, pit, trench and hillside silos, by the Agricultural Branch.

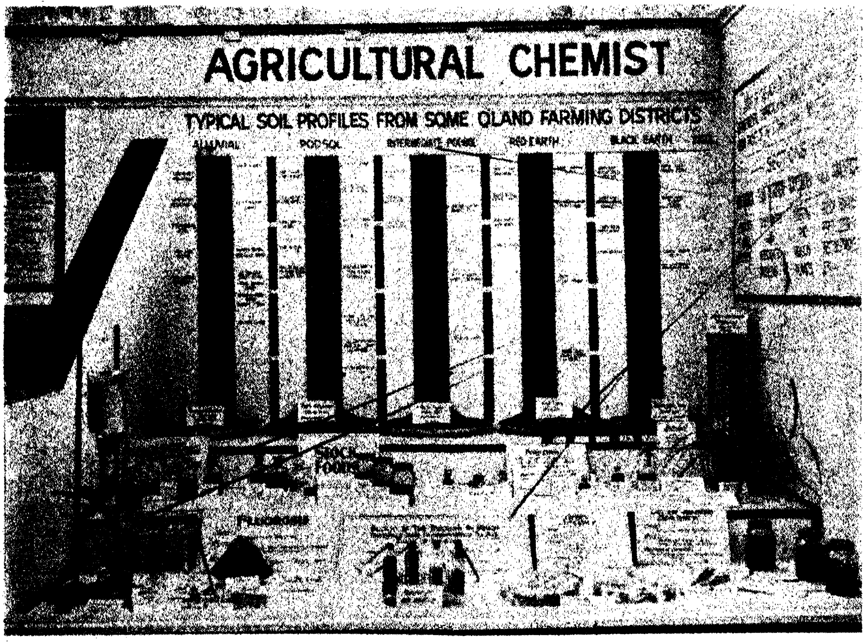


Plate 77.

AGRICULTURAL CHEMISTRY.—An Interesting and Educational Exhibit.

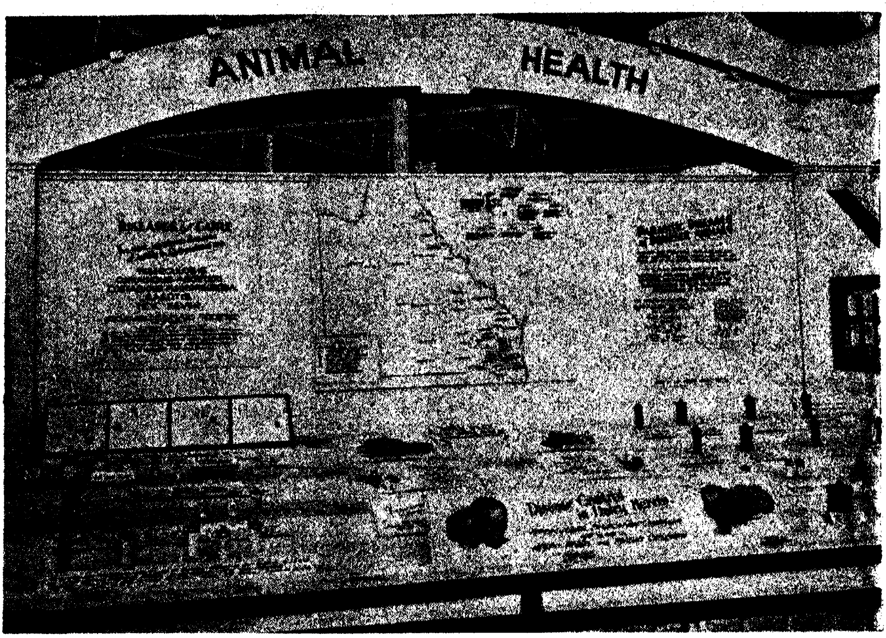


Plate 78.
DISPLAY OF THE ANIMAL HEALTH BRANCH, WITH STOCK DISEASES FROM DIAGNOSIS TO CURE AS THE MAIN THEME.

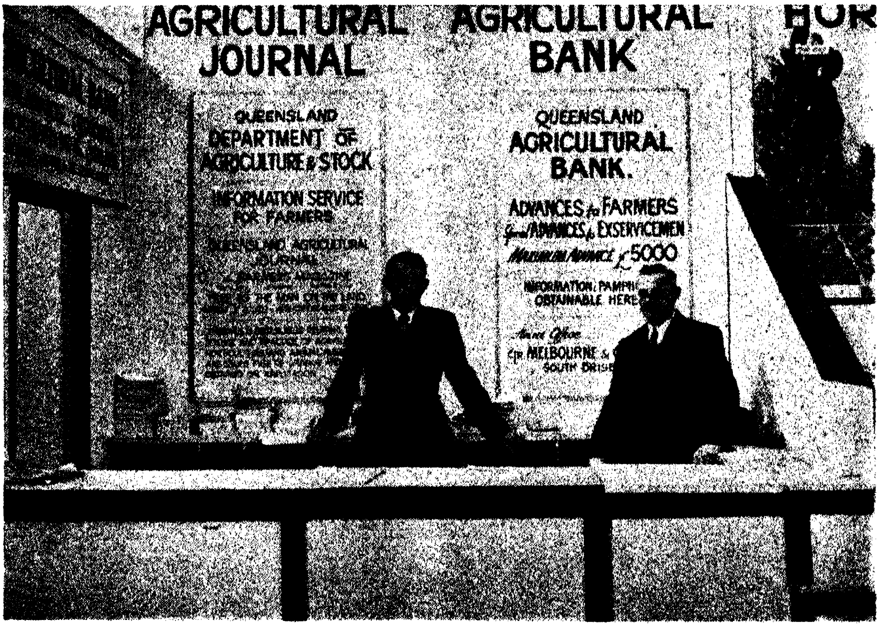


Plate 79.
THE JOURNAL CORNER.—A well-organized and efficient information service for farmers at the Show was provided by the Department of Agriculture and Stock in association with the Queensland Agricultural Bank. Messrs. E. Matthews (left) and W. Rutherford (right) were among the representatives of the Department and Bank, respectively.

GENERAL NOTES

Excess Moisture in Chaff.

The Minister for Agriculture and Stock (Mr. H. H. Collins) stated recently that complaints had been received by the Department of Agriculture and Stock that consignments of chaff were being received in very bad condition because of overwetting the hay before chaffing it. In such cases, not only is the buyer paying for water but the chaff deteriorates rapidly because of the formation of mould and, therefore, becomes unfit for use as fodder. The loss of fodder is particularly serious in this drought period in addition to the monetary loss sustained by the buyers.

The Minister explained that the *Stock Foods Acts and Regulations* provide that the amount of moisture (water) allowed in chaff must not exceed 12 per cent. by weight. Any person selling chaff which contains moisture above that percentage renders himself liable to proceedings under those Acts.

Assessment on Milk in South Coast Area.

The extension of tuberculin testing operations to dairy herds in the South Coast area from which milk supplies are drawn for consumption or use in the towns of Southport and Coolangatta, and that portion of the area of the Nerang Shire east of the South Coast railway line, has been announced by the Minister for Agriculture and Stock (Hon. H. H. Collins).

In pursuance of the provisions of the *Diseases in Stock Acts*, the Minister has levied an assessment of one-farthing (¼d.) on every gallon of milk supplied for consumption or use in such area, which shall be payable from the 8th July.

An *Order in Council* and *Regulation* making provision for the collection of the levy in the area in question and its payment to the Under Secretary, Department of Agriculture and Stock, on milk supplied during each period of three calendar months ending respectively on 31st March, 30th June, 30th September, and 31st December, have received the approval of the Executive Council.

Hitherto, said Mr. Collins, testing operations which have been in progress for some time in the South Coast area have been restricted to the herds from which milk supplies are drawn for the Brisbane market. The extension of the levy provisions of the *Diseases in Stock Acts* to the South Coast and the testing of all herds in that area is in furtherance of the Government's policy of a pure milk supply in this State.

BROOM MILLET SEED FOR SALE.

To growers desirous of obtaining a pure and reliable strain of White Italian Broom Millet seed, the Department is offering a limited supply of seed raised from a specially selected strain.

Applications for seed, with accompanying remittance, should be addressed to—

The Under Secretary,
Department of Agriculture and Stock,
BRISBANE.

Postal address and name of railway station should be given.

Price.—The seed is being retailed at **6d. per lb.,** freight paid to purchaser's nearest railway station. Each applicant is limited to 10 lb.

The FARM HOME

Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

CARE OF THE EXPECTANT MOTHER.

THE objects of the care of the expectant mother are so to conduct the mother and child through pregnancy as to ensure that both are healthy and strong and ready for the birth of the baby, with the assurance of a successful confinement, a living child, and a prompt recovery by the mother, while the newly born infant is given a good start in life.

In order to obtain these results it is necessary to build up the mother's health by making sure that she has the right kind of food. Some mothers think they must overeat, thinking they must feed two. This is not so. It is not *how much* the mother eats but *what* she eats that matters. To supply the needs of her growing baby and herself, an expectant mother requires more body-building material, and particularly more lime, iron, and vitamins than does a woman who is not pregnant. These can be supplied in the diet without adding to its bulk. Without a sufficient supply of these substances, both the mother and the child suffer. The child may be born anaemic or have defective teeth or have rickets, or be unable to resist illnesses, while the mother is more prone to anaemia or haemorrhages if these substances are lacking.

Foundation foods—which are milk, meat, the dairy products, fruit, vegetables, and wheatmeal bread—should form the basis of the diet. An expectant mother should take 2 pints of milk, one or two substantial helpings of green vegetables, an apple or orange, 1 oz. of butter, and ½ oz. of cheese, 6 oz. of potatoes, 4 oz. of meat, wheatmeal bread, and wheatmeal or oatmeal porridge in her daily diet. Fish should be had twice weekly, and liver (preferably calf's) twice weekly also. In addition, the mother should take 2 teaspoons of cod liver oil daily. Milk should be pasteurized, and if this is not procurable all milk should be boiled. If mothers cannot obtain fresh milk a good brand of full-cream dried milk should be used. If, for any reason, the mother is not able to get any of the above-mentioned articles of diet, she should consult her doctor or ante-natal clinic and they will, by the addition of concentrated vitamins and minerals, make up for any deficiency.

By keeping strictly to this diet the child has a good start before he is born and while he is being fed by his mother, and will have the power to respond to treatment when overtaken by illness; but, if the diet has been neglected, the child will be born puny and with less power to resist disease; and even if he is well fed during childhood he will be handicapped, both in development and in the power to resist infection, for many years.

Attention should be given to the general health of the mother, and this is most important. Long walks in the cool of the evening are helpful by promoting sleep, aiding digestion, and keeping the muscles in good condition. Violent exercise of any kind must be avoided. An expectant mother should have at least eight hours sleep daily, and a rest in the middle of the day, with the feet elevated, should be taken where possible. Sitting on a high stool to iron, peel vegetables, and do other tasks, and putting the feet up while mending or sewing, will help the busy mother to get the necessary rest. Tepid plunge baths may be taken until the last two months, when a shower should replace the plunge. The teeth should be cleaned after every meal, and decayed teeth should be extracted at once. Alcohol and tobacco are definitely injurious to the growing baby and should be prohibited.

The breasts should be washed daily with warm water and soap, gently dried, and massaged. Constipation is common with pregnancy, and fluids, fresh fruits, green vegetables, wholemeal brown bread, porridge, and a glass of hot water immediately on rising or just after, all have a laxative effect. If an aperient is necessary the doctor or ante-natal centre should be consulted. All clothing should hang loosely, and tight garments and round garters should not be worn. Patterns for maternity corsets can be obtained at the *Maternal and Child Welfare Office, 184 St. Paul's Terrace, Brisbane.* High-heeled shoes should not be worn.

An important duty of the doctor and nurse is to prepare the mother for her approaching confinement, and this cannot be done unless she visits her doctor or ante-natal centre regularly. By so doing she will be educated to approach her confinement with a quiet, confident, and untroubled mind, and much invalidism and wretchedness will have been prevented.

In her own interests the expectant mother is, therefore, urged to co-operate with her doctor or centre by attending regularly, and if she cannot do so she can enrol with the *Ante-natal Correspondence Service at 184 St. Paul's Terrace* and advice will be freely and willingly given.

Any further information may be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau, 184 St. Paul's Terrace, Brisbane,* or by addressing letters "Baby Clinic, Brisbane." These letters need not be stamped.

IN THE FARM KITCHEN.

Our Daily Bread.

Buttermilk Bread.

Any light loaf of the scone type is quickly made, but this one that makes use of buttermilk can be mixed and baked in next to no time. Served with butter it is delicious either hot or cold—and useful when the bread supply is low: 1 lb. either wholemeal or white flour, 1 teaspoon cream of tartar, 1 teaspoon carbonate soda, 1 level teaspoon salt, ½ pint buttermilk (about). If sweet milk is used, half the quantity of carbonate soda. Sift flour, salt, and rising powders into a bowl. Add buttermilk, and with a pliable knife mix to a fairly soft dough. Turn on to a floured board, knead lightly and quickly, and shape into a round flat cake or a long roll. Place on a floured oven tray and bake in a hot oven for 20-30 minutes—according to thickness. The appearance is improved by glazing with beaten egg or milk before baking.

Currant Bread.

Three pound flour, 3 teaspoons salt, 1 oz. yeast, 2 teaspoons sugar, 3 oz. lard, 10 oz. currants, 1 pint milk, ½ pint water. Spices may be substituted for currants. Add the salt and currants to the flour and warm. Cream the yeast with the sugar. Melt the lard in the milk, add the water and make lukewarm. Add a little to the yeast, make a hole in the centre of the flour, pour in the yeast, and mix to a light dough with the liquid. Knead well, set to rise till double the size. Knead down, form into loaves, place in greased tins, allow to rise to top of tin. Place in a hot oven and bake half an hour.

Brown Health Loaf.

This is tasty and wholesome, and can be made and baked in an hour. Take 2 cups wholemeal flour, 2 cups bran, 1 cup plain flour, pinch of salt, 2 teaspoons cream of tartar, 1 teaspoon carbonate soda, 1 tablespoon brown sugar, 2 tablespoons treacle, 1 cup fruit (dates, raisins, or sultanas). Mix to a soft dough with milk, and bake in a baking dish about three-quarters of an hour.

Brown Bread.

Take 2 cups flour, 1 cup wholemeal, 1 teaspoon each carbonate soda and cream of tartar, 1 tablespoon treacle, about 2 cups buttermilk. Method—Bake for an hour.

QUEENSLAND WEATHER IN AUGUST.

During the third week of August some light, scattered and mostly unimportant showers and local thunder were reported in parts of the Central Highlands, East Downs, and Moreton districts. Apart from this retricted area, August completed a four-months practically rainless period over most of the State, and in many inland areas the dry spell commenced after the useful January distribution. District average aggregate rainfall figures for the four months, as shown in the table below, are either the lowest or near lowest records for the specific four months. Soaking relief rains, followed by mild conditions, are required in practically all pastoral, agricultural, and dairying districts. With cold dry air and cloudless skies, persistent frosts have also been widespread during the winter, adverse affects on growing crops, fruit, and cane being reported over the south-east quarter and well north through the Central Coast tropical section.

Pressure.—The steady sequence of dry cold air continental anticyclones was maintained, centres moving slowly across inland Australia. As in the previous month the excessive low pressure activity over waters south of the Continent did not penetrate inland There was a complete absence of any tropical air flow or useful trough formations. Between the 24th and 28th, a slight dip formation brought isolated showers and thunder between the Central Highlands and the south-east corner of the State, but the Moreton district averaging only 39 points was easily the best distribution.

Temperatures.—Average maximum temperatures were again above normal, from 0.1 deg. at Boulia to 4.5 deg. at Mitchell. Minimum averages were mostly considerably below, from 0.4 deg. at Longreach to 6.5 deg. at Palmerville. Boulia and Urandangie recorded five consecutive days over 90 deg.

Frosty Nights.—Herberton, 1; Tambo, 14 (extremes 30 deg./20 deg., 1st); Stanthorpe, 23 (extremes 17 deg./8 deg., 5th); Mitchell, 26 (12 consecutive, extremes 24 deg./15 deg., 20th). Local frosts also affected South and Central Coast districts.

Dust and smoke haze periods accompanied a more than usual number of *local bush fires* in the south-east quarter of the Staee. In the metropolitan and adjacent areas many calls were made on the fire brigade, especially about the middle of the month. Brisbane 3 p.m average relative humidity of 36 per cent. for the month was 12 per cent. below normal.

The rainfall position is summarised below:—

Division.	Normal Mean.	Mean 1946.	Departure from Normal.	Aggregate 4 mths. total May, June, July, and August.	Average May, June July, and August.
	Points.	Points.	Per cent.	Points.	Points
Peninsula North	20	2	90 below	183	257
Peninsula South	7	Nil	100 ,,	Nil	126
Lower Carpentaria	10	Nil	100 ,,	3	119
Upper Carpentaria	25	Nil	100 ,,	1	208
North Coast Barron	114	20	82 ,,	397	733
North Coast Herbert	167	6	96 ,,	306	1,065
Central Coast East	77	Nil	100 ,,	68	550
Central Coast West	50	Nil	100 ,,	13	326
Central Highlands	84	12	86 ,,	28	486
Central Lowlands	48	Nil	100 ,,	15	334
Upper Western	16	Nil	100 ,,	1	175
Lower Western	32	Nil	100 ,,	Nil	225
South Coast Port Curtis	118	23	81 ,,	103	750
South Coast Moreton	169	39	77 ,,	141	1,042
Darling Downs East	131	19	85 ,,	88	651
Darling Downs West	88	4	95 ,,	29	531
Maranoa	91	1	99 ,,	14	538
Warrego	75	Nil	100 ,,	13	428
Far South-west	49	Nil	100 ,,	19	316

Commonwealth Meteorological Bureau, Brisbane.

THE COUNTRYMAN'S SESSION

Sunday Morning Radio Service to Farmers

(By arrangement with the Australian Broadcasting Commission)

Farmers are recommended to tune in to either a
Queensland National or Regional Station.

EVERY SUNDAY AT 9.5 a.m.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

AUGUST RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.	No. of years' records.	Aug., 1945.	Aug., 1946.		Aug.	No. of years' records.	Aug., 1945.	Aug., 1946.
North Coast.	In.		In.	In.	*South Coast—cont'd.*	In.		In.	In.
Atherton	0·84	42	0·72	0·12	Gatton College ..	1·08	44	1·08	0·42
Cairns	1·65	61	0·37	0·13	Gayndah	1·12	72	0·26	0·52
Cardwell	1·22	71	0·16	0·12	Gympie	1·65	73	0·16	0·50
Cooktown	1·17	67	0·52	0·33	Kilkivan	1·35	62	0·17	0·46
Herberton	0·61	57	0·33	0·15	Maryborough ..	1·61	72	0·43	0·64
Ingham	1·44	51	0·67	0·03	Nambour	1·88	47	0·22	0·04
Innisfail	4·85	62	1·24	0·14	Nanango	1·29	61	0·88	0·57
Mossman	1·34	19	0·32	0·10	Rockhampton ..	0·82	72	0·01	0·01
Townsville	0·50	72	Nil	Nil	Woodford	1·61	55	0·51	0·45
Central Coast.					*Darling Downs.*				
Ayr	0·58	56	0·09	Nil	Dalby..	1·16	73	1·37	0·03
Bowen	0·72	72	Nil	Nil	Emu Vale	1·06	47	1·26	0·30
Charters Towers ..	0·50	61	Nil	Nil	Jimbour	1·10	64	0·82	0·20
Mackay	1·09	72	0·09	Nil	Miles	1·08	58	1·53	0·07
Proserpine	1·45	40	0·78	Nil	Stanthorpe	1·73	70	2·85	0·30
St. Lawrence ..	0·79	72	0·48	Nil	Toowoomba	1·58	71	2·15	0·58
					Warwick	1·40	78	2·28	0·05
South Coast.									
Biggenden	1·04	44	0·04	0·35	*Maranoa.*				
Bundaberg	1·27	60	Nil	0·13	Roma	0·86	69	0·76	Nil
Brisbane Bureau ..	1·89	94	0·87	0·40	St. George	0·91	62	1·11	Nil
Caboolture	1·62	67	0·42	0·67					
Childers	1·21	48	0·03	0·48	*Central Highlands.*				
Crohamhurst.. ..	2·17	50	0·50	1·37	Clermont	0·70	72	Nil	0·03
Esk	1·39	56	0·48	0·42	Springsure	0·99	74	0·03	0·61

CLIMATOLOGICAL TABLE FOR AUGUST.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric Pressure Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	80	52	87	15	49	3	13	1
Herberton	..	73	50	81	15	33	3	15	1
Townsville	..	79	66	88	19	47	3	Nil	..
Rockhampton	30·12	80	48	89	14	38	16, 20, 21	1	1
Brisbane	..	76	49	91	14	42	21, 22	40	1
Darling Downs.									
Dalby	..	75	38	90	13	28	31	3	1
Stanthorpe	..	68	30	85	13	17	5	30	1
Toowoomba	..	71	38	86	13	21	17	58	1
Mid-Interior.									
Georgetown	30·05	85	51	90	11	46	2, 3	Nil	..
Longreach	30·15	82	46	92	12	40	17, 20	Nil	..
Mitchell	30·16	75	34	92	13	24	20	4	1
Western.									
Burketown	..	85	56	92	10	49	2	Nil	..
Boulia	30·10	79	47	93	13	39	20, 21	Nil	..
Thargomindah	30·13	73	43	95	13	37	5	Nil	..

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

Supplied by the Astronomical Society of Queensland.

OCTOBER.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Day.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	5.29	5.47	Cairns	37	20	Longreach	39	31
6	5,23	5.40	Charleville ..	28	26	Quilpie	34	36
11	5,18	5.52	Cloncurry	55	44	Rockhampton ..	14	7
16	5.13	5.55	Cunnamulla ..	29	30	Roma	18	16
21	5.07	5.58	Dirranbandi ..	18	20	Townsville ..	31	18
26	5.03	6.01	Emerald	23	15	Winton	44	35
31	5.00	6.04	Hughenden ..	40	29	Warwick	3	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.

Day.	Rise.	Set.
	a.m.	p.m.
1	9.00	11.06
2	9.42	11.59
3	10.29	..
4	11.19	a.m. 12.51
5	p.m. 12.14	1.40
6	1.12	2.25
7	2.11	3.07
8	3.11	3.46
9	4.12	4.22
10	5.14	4.58
11	6.18	5.33
12	7.23	6.11
13	8.31	6.51
14	9.39	7.35
15	10.47	8.25
16	11.51	9.20
17	..	10.21
18	a.m. 12.49	11.24
19	1.41	p.m. 12.28
20	2.25	1.30
21	3.04	2.30
22	3.39	3.28
23	4.11	4.24
24	4.43	5.19
25	5.14	6.14
26	5.46	7.08
27	6.20	8.03
28	6.57	8.58
29	7.38	9.52
30	8.22	10.44
31	9.11	11.33

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27 ; Cunnamulla 29 ; Dirranbandi 19 ;
Quilpie 35 ; Roma 17 ; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Day.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	28	11	44	26	19	1	52	29
6	27	12	43	26	18	1	51	29
11	17	20	32	36	8	11	37	42
16	10	29	26	44	0	20	28	52
21	14	23	29	39	4	14	33	45
26	24	14	40	29	15	4	46	33
31	29	10	45	25	20	0	52	28

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS)

Day.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	51	5	65	34	49	20	42	7
3	53	4	67	34	50	20	44	6
5	52	5	66	34	50	20	43	7
7	45	10	61	38	45	23	37	11
9	35	19	54	44	39	29	29	18
11	23	32	46	52	31	37	21	27
13	13	42	39	58	24	44	13	35
15	6	50	36	63	20	49	7	42
17	5	52	35	65	20	50	6	44
19	8	48	37	62	21	48	8	40
21	15	39	41	57	26	42	15	33
23	26	30	48	50	33	35	22	25
25	36	19	55	44	40	29	30	18
27	45	10	61	38	45	23	37	11
29	51	4	65	34	49	20	42	6
31	53	4	67	34	50	20	44	6

Phases of the Moon.—First Quarter, October 3rd, 7.53 p.m.; Full Moon, October 11th, 6.40 a.m.; Last Quarter, October 17th, 11.28 p.m.; New Moon, October 25th, 9.32 a.m.

On October 16th the sun will rise and set 10 degrees south of true east and true west respectively, and on October 10th and 24th the moon will rise and set at true east and true west respectively.

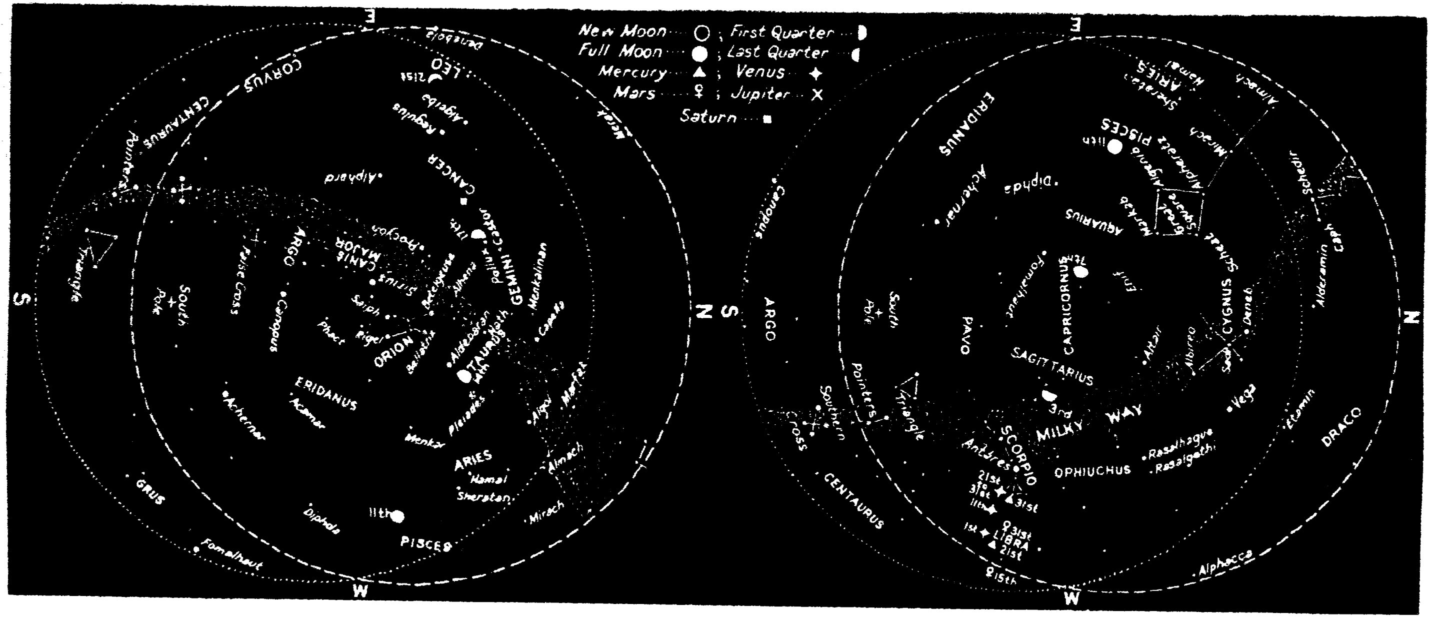
Mercury.—At the beginning of October, not far from Spica, Mercury will set about 1 hour after the sun. Throughout the month the interval of setting after sunset will increase until the 31st, when it will be at its greatest angle east of the sun, and will set about 2 hours after sunset. It will then have reached "the head" of Scorpio.

Venus.—On October 13th reaches greatest brilliancy, and on October 28th will be stationary, after which it will appear to retrace its path among the stars. It will set between 9.10 p.m. and 10.15 p.m. on the 1st and between 8.10 p.m. and 9.15 p.m. at the end of the month. It, too, will be in "the head" of Scorpio at the end of the month.

Mars.—At the beginning of the month, near Jupiter, will set between 7.50 p.m. and 8.50 p.m., but by the end of the month, not far from Scorpio, may be difficult to be seen in the glow of the setting sun, when it will set between 7.30 p.m. and 8.30 p.m.

Jupiter.—Will set between 7.30 p.m. and 8.30 p.m. on the 1st, but later in the month it will be too close in line with the sun for observation, being in conjunction with the sun on the 31st.

Saturn.—At the beginning of the month will rise between 2.15 a.m. and 3.30 a.m. about 23 degrees north of true east, and at the end of the month will rise about midnight.



Star Charts.—The chart on the right is for 7.15 p.m. in the south-east corner of Queensland to 8.15 p.m. along the Northern Territory border on the 15th October. (For every degree of longitude we go west, time increases 4 minutes.) The chart on the left is for 9 hours later. On each chart the dashed circle is the horizon at Cape York and the dotted circle the horizon along the New South Wales border. When facing north hold "N" at the bottom; when facing south hold "S" at the bottom, and similarly for the other directions. Only the brightest stars are included, and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus, at the beginning of the month the stars will be in the positions shown above 1 hour later than the time stated for the 15th, and at the end of the month about 1 hour earlier than that time. **The positions of the moon and planets,** which are continually changing in relation to the stars, are shown for certain marked days. When no date is marked the position is for the middle of the month.

AUSTRALIAN WOOL REALIZATION COMMISSION

Notice to Exporters of Wool

The Commonwealth Government has directed that the prohibition on the export of wool unless the export be with the permission of the Minister for Trade and Customs is to continue, and the prohibition is to be administered by the Department of Trade and Customs in collaboration with the Australian Wool Realization Commission.

The following procedure will apply to shorn wool (greasy or scoured) and wool derived from sheepskins, but it will not apply to wool consigned by a grower for sale by auction in the United Kingdom; to wool on the skin; to manufactured wool, including wool tops, wool noils, or manufacturer's wool waste.

1. Collectors of Customs will not permit the export of SHORN WOOL OR WOOL DERIVED FROM SHEEPSKINS (not being wool consigned by a grower for sale by auction in the United Kingdom) unless the exporter produces a certificate from the Commission to say that he is an exporter approved by the Commission.
2. **A Certificate of Approval will be granted by the Commission only on the condition that the exporter does not export any shorn wool, whether greasy or scoured** (not being wool consigned by a grower for sale by auction in the United Kingdom), **which has not been purchased at an auction approved by the Commission.**
3. The Certificate should be presented by the exporter to the Collector of Customs in the State concerned, who will retain it and record the exporter as an exporter of wool approved by the Commission in terms of the Certificate.
4. A duplicate of the Certificate will be supplied for the exporter's own records.
5. The Commission's approval of an exporter will be withdrawn should that exporter export or attempt to export shorn wool not purchased at an auction approved by the Commission.
6. Wool appraised under the National Security Wool Regulations which has not since been purchased by public auction will not be covered by the Certificate and, as at present, the Collector of Customs will require the endorsement of the Australian Wool Realization Commission (State Office) on applications for licences to export such appraised wools.
7. The serial number of the Certificate must appear on all applications for licenses to export shorn wool which has been purchased at auction or wool derived from sheepskins, but not on applications for licences to export wool which is not covered by the Certificate.

Exporters who wish to export shorn wools or wool derived from sheepskins under the conditions determined by the Government and who have not received a certificate of approval as an exporter from the Australian Wool Realization Commission should make application to the Commission at the address below.

Merchants. dealers, repackers, and country buyers who desire to buy direct from growers may do so, but before the export of the wool so purchased will be possible it will be necessary to submit that wool to auction in Australia in the normal way. Persons desiring to fulfil orders received from overseas clients will have full opportunity to purchase their requirements at auction.

Growers who wish to continue their prewar practice of consigning wool to their brokers in the United Kingdom for sale by auction there may do so without application to the Commission for an approval to export, but under the Contributory Charge legislation such growers must complete an approved arrangement with the Commissioner of Taxation for purposes of ensuring the collection of the correct amount of Contributory Charge.

H. B. LEIGH, Secretary,
31st August, 1946. 540-542 Lt. Collins Street, Melbourne.

Volume 63 Part 4

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

OCTOBER, 1946

Issued by Direction of
THE HONOURABLE H. H. COLLINS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

PAGE.

Event and Comment—
- Australian Meat in Britain 195
- Bush Fire Hazards 196

Field Crops—
- Canning or Navy Bean Production in Queensland 197

Fruit Culture—
- Summer Pruning of Grape Vines .. 202

Plant Protection—
- Control of the Leaf-Miner in Tobacco 204

The Dairy Industry—
- Improvement of Cream Grades .. 208
- Observations on Dairy Production in New Zealand 211
- Production Recording 220
- Queensland Cheese Production, 1945-46 224

Beef and Dairy Cattle Champions .. 228

The Pig Farm—
- Export Baconer Pigs 235

Marketing—
- Co-operative Marketing in Queensland 240

General Notes—
- Staff Changes and Appointments .. 248
- Testing of Stock for Disease .. 248
- Burdekin River Trust 248
- Banana Board Levy 248
- Trans-Border Stock Passings .. 248

Gadgets and Wrinkles—
- A One-man Loader for Trucks .. 249
- A Simple Truck Loading Help .. 249
- A Novel Trailer Hitch Pin 249

The Farm Home—
- The Baby's Sleep is Important .. 250
- Dishes for Dinner 251

Queensland Weather in September .. 252

Rainfall in the Agricultural Districts 253

Climatological Table for September .. 253

Astronomical Data for Queensland .. 254

STATE'S SEEDS

★ ARE GOVERNMENT TESTED ★

	Bushel s.	d.
Beans—Brown Beautys - -	70	0
Beans—Canadian Wonders -	75	0
	Lb.	
Saccaline—Bag Lots - -		3½
Less than Bag Lots		4
Pumpkins—Beaudesert - -	5	0
Pumpkins—Cattle - - -	2	6
Rape—Dwarf Essex - -	1	1
Rape—Giant Kangaroo - -	1	2

ASK FOR YOUR REQUIREMENTS

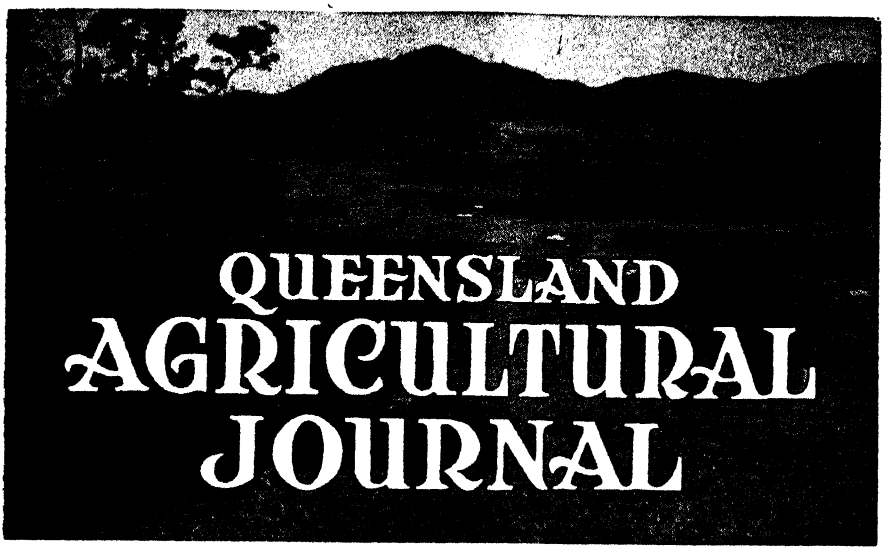
SUDAN SEED

Prime, regraded, recleaned.
Free Johnson grass and other weeds.

	Lb.
Bag Lots - - - -	**7d.**
Less Bag Lots - - -	**7½d.**

State Produce Agency Pty. Ltd.
ROMA STREET **BRISBANE**

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, including postage. General Public, **Ten Shillings**, including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Volume 63 1 OCTOBER, 1946 Part 4

Event and Comment.

Australian Meat In Britain.

ADVERSE seasonal conditions and heavy commitments for supplying Australian and Allied armed forces in the South-west Pacific and other operational areas were reflected in the reduced quantities of meat exported to the United Kingdom last year, according to the annual report of the Agent-General (Mr. L. H. Pike). The total quantity of Australian meat of all kinds placed on the British market during the period under review was approximately 92,000 tons, compared with, say, 94,000 tons in 1944, and about 260,000 tons in the first twelve months of the war. "A welcome feature of the market during 1945," states the Agent-General, "was the resumption of the shipment of Queensland beef in the quarter. The bulk of this excellent consignment was delivered direct to retail establishments in the London area, and it was gratifying to see Australian meat once more displayed in the shops. This is a good augury for the future."

It is further reported that Queensland and Australian pig meat generally has maintained the standard which was making it popular with bacon curers before the war, despite the inevitable stimulation of production of quantity rather than quality. For this year, it is estimated that meat shipments will be increased nearly three-fold. This considerable increase in our meat trade should be sufficient to place Australia nearer to the top of the United Kingdom import list.

The future of our meat industry is at present based on the agreement between the United Kingdom and Commonwealth Governments for the sale to Britain of the whole of our exportable surplus of beef, mutton and lamb for the period ending 30th September, 1948. The purchase also covers certain agreed quantities of pig meat.

It is anticipated, the Agent-General says, that within a year or two Danish bacon will have regained "its former pre-eminent position in the United Kingdom market." Nevertheless, a ready outlet may be expected for Australian frozen pigs of the big, lean-bacon type which was attracting much attention just before the outbreak of war. "From an economic point of view, the United Kingdom authorities naturally prefer to import frozen pork for home curing than the finished article—bacon."

Bush Fire Hazards.

Among the more important measures submitted to the State Parliament in the course of the current Session is the *Rural Fires Bill* which is to supersede the *Rural Fires Act of* 1927. In introducing the new measure, the Secretary for Public Lands, Hon. A. Jones, said that its main purposes included more adequate provision for the prevention and control of bush fires, strengthening the organization and extending the powers of the Rural Fires Board and of bush fire brigades, and the imposition of heavier penalties for breaches of the law.

Continuing, Mr. Jones said that all were aware of the enormous damage caused by bush fires in Queensland and other parts of the Commonwealth during recent dry months, and most of them had been caused by carelessness in the use of fire. It was intended to establish rural fire districts over each of which a chief fire warden would have jurisdiction, and local areas within each district under the control of fire wardens. The chief fire wardens would be given authority to approve of fire breaks, receive objections to burning, grant permits to burn, order postponement of burning, forbid burning, take charge of the bush fire brigade, arrest any person refusing to give his name and address, or decide what assistance might be necessary to control a fire, and to carry out all the duties of fire wardens. In districts where fire wardens were appointed, their duties under delegated authority would be largely similar. Under the new legislation, bush fire brigades would be established in various parts of the State and given necessary powers and protection, and the Minister would have authority to declare any area an emergency fire district, in which prescribed penalties would be doubled for breaches of the law.

There are many theories as to unknown or obscure causes of bush fires—lightning striking dry grass, bottles become burning glasses under fierce sunrays, the frictional rubbing of tree bough on bough when a high, dry wind is blowing, spontaneous combustion and other possible causes—but bush fires are usually man-made. The careless camper, the traveller who boils his billy at the butt of a dead stump or against a log with a "pipe" in it and leaves the fire burning, forgetting that a hollow log may act as a funnel for a gusty wind to blow flames through to fan out and set ablaze a whole countryside, are often the culprits.

The proclamation of regional fire districts under the control of experienced men in whom will be vested authority to enforce fire prevention practices and precautions against fire hazards will no doubt, under the decentralized administration for which the Bill provides, go far towards reducing the bush fire menace to a minimum. Embodying all the beneficial provisions of the old Act, the new measure will make for better organization and the practical co-operation of all concerned. It will be welcomed in all parts of Queensland where seasonal bush fire risks are very real.

Field Crops

Canning or Navy Bean Production in Queensland.

J. A. KERR, Senior Adviser in Agriculture.

THE profitable production of navy beans and allied varieties of canning beans, which was commenced during the 1941-42 season, has continued. This should encourage the planting of increased acreages by experienced growers, and new growers may be attracted to the industry in districts where soil and seasonal conditions have proved suitable. The dried mature plants are harvested, and the seed threshed out to be used as food for man.

Relatively low production costs, due to completely mechanical harvesting and threshing, offer an inducement for the establishment of large individual areas, while the high net return per acre makes the crop also suitable for the smaller growers. Beans are of value as a rotation crop, leaving the soil in good tilth, and generally improving the yields of succeeding crops. This is particularly evident when crops are threshed in the field with pick-up threshers.

Season.

Canning beans are a summer crop and mature in from 70 to 110 days, according to variety. As they are susceptible to frost injury, suitable planting months will safely extend from the first frost-free months of the district concerned up to the end of January. The most favoured planting period will vary in different districts. Late December to the end of January is recommended in the South Burnett. Here January planting should result in crops maturing during April, when harvesting weather is usually favourable. Moreover, January planting should conveniently fit in with other farm crop operations, permitting the previous completion of planting and first cultivation of most other summer row crops. Earlier plantings are usually favoured on the eastern Darling Downs.

Susceptibility to Bean Fly Attack.

In areas subject to bean fly infestation, early planting is usually recommended, but in districts where other related bean crops are not extensively grown, early planting, by increasing the bean fly population, tends to increase the risk of damage by fly to the main plantings later in the season. It is, therefore, suggested that avoidance of early planting in districts similar to the South Burnett would be generally beneficial.

Varieties.

Michelite, maturing in approximately 12 to 14 weeks, is probably the most popular variety. It vines somewhat less than the Californian White and Navy varieties, and produces a heavy crop of medium-sized, plump, white seeds. It generally remains more upright in habit than Californian White and Navy and accordingly supports a higher percentage of pods free from contact with the soil, an important feature when rain interferes with the harvest. Navy matures in from 12 to 14 weeks, while the Californian Small White takes a week or two longer.

Pinto is a high yielding variety bearing a mottled seed. It is not favoured for canning, though it should be of value for the dried bean trade. Two strains are grown in America—early and late—the late being a particularly heavy cropper. Only the early strain has been grown in Queensland. Maturing in about 10 weeks, it produced a high yield, less susceptible to weather staining than the white varieties.

Other varieties tested include Otenashi, Asada Pearl, and Great Northern. The first two are not favoured owing to their tendency to shatter when ripe.

Soils.

Friable, well drained soils of average fertility will grow good beans. Poorly drained soils, even if they possess some suitable characteristics, should be avoided wherever possible. High yields have been obtained from soils varying from sandy loams to chocolate soils, including a large range of red loams, but planting on poor soils is not recommended. On the Darling Downs the heavy black soils have not proved so suitable for beans as the lighter loams and scrub soils. Little work on fertilizer requirements of canning beans has been carried out in Queensland, but possibly superphosphate at the rate of 1 to 2 cwt. per acre would prove beneficial in increasing yields and inducing a more even ripening of the crop. An endeavour should be made to avoid intimate contact of the seed with the fertilizer in the seed-bed, otherwise faulty germination may result.

Soil preparation for beans should be in accordance with normal cultural methods designed to conserve moisture, eliminate weed growth, and produce a medium-fine seed-bed. Early ploughing, following a suitable rotational crop, is naturally highly beneficial.

The inoculation of seed with a suitable bacterial culture may be beneficial on soils new to canning beans. The culture can be obtained at a nominal charge from the Department of Agriculture and Stock, Brisbane.

Planting.

Planting may be done with a maize planter or by the use of an ordinary grain drill with the majority of grain runs blocked.

Row spacing generally varies from 28 to 36 inches, the wider spacing being necessary on rich rain-forest soils owing to the prolific foliage developed on these soils. Seed should be planted 2 to 3 inches deep, the shallower planting being advisable for heavy soils. Plant spacing in the row should average about 3 inches. Wider spacing in the row lengthens the period to maturity and results in irregular ripening, thus complicating harvesting.

The rate of planting will vary according to variety and spacing. Small seeded varieties at the wider row spacing may require to be sown at 12 to 15 lb. per acre, while double that quantity may be needed for larger seeded varieties, such as Pinto.

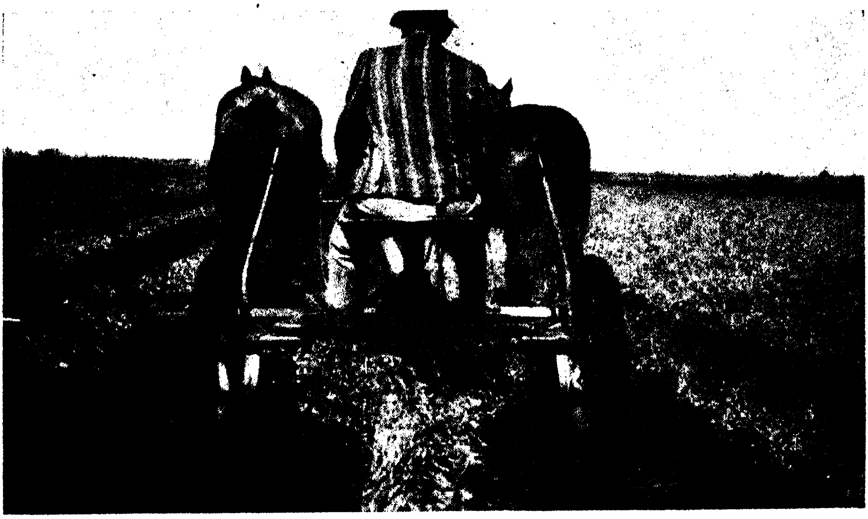


Plate 80.
A Two-row Bean Cutter.

Cultivation.

The amount of cultivation required after planting will vary according to soil and seasonal conditions, but clean cultivation improves yields and simplifies harvesting. Late planted crops will generally require less cleaning than early planted crops.

Harvesting.

The stage of maturity of the bean plant at which harvesting should be carried out will depend on the harvesting methods adopted. Where suitable harvesting machinery is not available, the beans may be pulled by hand when the majority of the beans are at least beyond the yellow stage, with a few becoming brittle. The beans will require further drying in the field, and may then be removed to storage sheds or be threshed in the field. Threshing of such crops may be completed in the field by means of a header-harvester, fitted with a pick-up attachment, or the crop may be conveyed to stationary threshing machines. Where mechanical threshers are not available, tramping with horses, or rolling, will give satisfactory results.

The best harvesting method for large areas, particularly where labour is limited, is to cut with a bean cutter and thresh by means of the header-harvester fitted with a pick-up attachment. Either the Robey bean cutter fitted to a tractor or the Harvey bean cutter drawn by horses may be used. These bean cutters cut two rows and direct them to a central windrow. Cutters are available on hire in South Burnett and Darling Downs bean growing districts, at a small charge per acre. When dried to a brittle stage in the field after cutting, the beans are ready for threshing. Where the modified header-harvester is used, it is recommended that the beans be permitted to reach an advanced stage of maturity, with most of the beans in a brittle stage, before using the cutter.

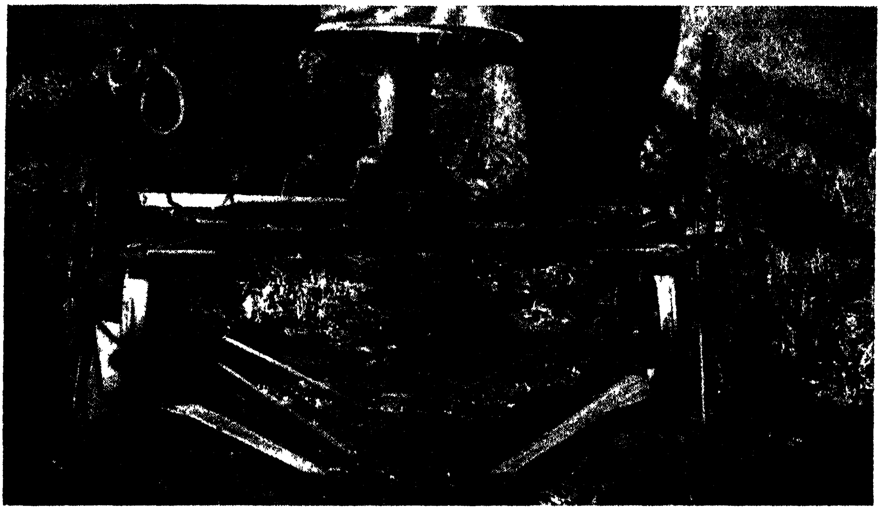


Plate 81.

A Close up View of a Two row Bean Cutter, showing Cutting Blades and Guide Rods for Placing Bean Plants into a Single Windrow.

Canning beans of the varieties recommended do not shatter freely nor weather-stain readily, although the pods may blacken when exposed to wet weather Continued misty rain will result in mouldy beans Most damage from mould or seed germination occurs when pods are in

Plate 82.

Modified Header-harvester Picking up Cured Bean Plants.

contact with the soil. Growers are advised not to cut or pull the crop in preparation for threshing unless weather conditions are favourable and the thresher is readily available, thus enabling undue exposure in the field to be avoided.

Yields.

Average yields are in the vicinity of 12 bushels per acre, but many higher yields should be obtained under favourable soil and seasonal conditions.

The Australian crop, which during the past few seasons has been less than the estimated Australian peace-time requirements, is grown principally in the Northern Tablelands of New South Wales and in the Killarney and Kingaroy districts in Queensland.

Plate 83.

REAR VIEW OF HEADER-HARVESTER IN OPERATION, SHOWING TRASH BEING RETURNED TO THE LAND.

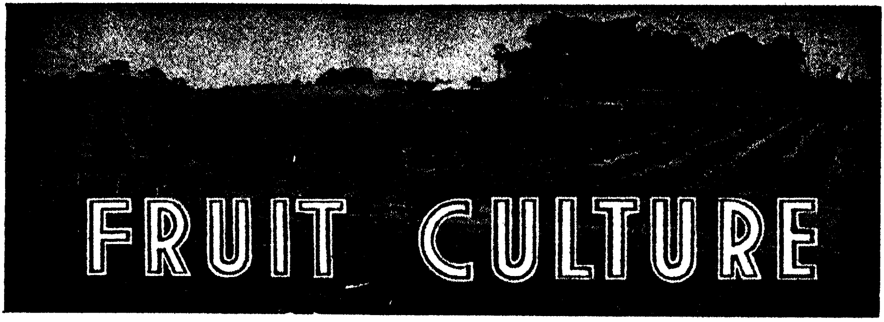
Marketing.

A Bean Marketing Board has been formed in New South Wales, and Queensland growers are at present engaged in establishing a Marketing Board to handle the Queensland crop. It is proposed that these two Marketing Boards will, by agreement, adopt similar grade standards and prices.

TO SUBSCRIBERS.

Please renew your subscription without delay. Write your full name plainly, preferably in block letters.

Address your subscription to the Under Secretary, Department of Agriculture and Stock, Brisbane.



FRUIT CULTURE

Summer Pruning of Grape Vines.

F. L. JARDINE, Adviser in Horticulture.

MOST of the grape vine varieties in the Stanthorpe district will have made sufficient growth by the third week in October to enable growers to make a fair estimate of their crop. Young bunches will then be plainly visible and will give a good indication of the forthcoming crop.

Some of the varieties, especially the Muscat Hamburg, usually show bunches far in excess of what the vines can comfortably support and ripen satisfactorily. Moreover, young cane growth in many instances is so dense that it would be unreasonable to expect the vines to support and ripen good marketable fruit and at the same time produce desirable cane growth.

Late October is the time to commence summer pruning, as the young canes are then sufficiently soft to snap off under pressure of the thumb and forefinger. Winter pruning and summer pruning are so closely allied to each other that one without the other is not sufficient to maintain correctly any given system of pruning—the two must be employed together in order to produce a vine of correct shape and sustained cropping powers.

Each spring, vines produce a number of superfluous shoots which, if allowed to remain, tend to diminish the vigour of the vine. In the case of bearing vines showing too many fruit blossoms, and also young vines, the suppression of young shoots is desirable in order to regulate the crop within reasonable limits. Moreover, these shoots if not summer pruned will have to be winter pruned, and the latter operation inflicts wounds that are more difficult to heal over than those resulting from summer pruning.

Summer pruning serves a dual purpose. In the first instance the crop is regulated according to the age and vigour of the individual vines. This is a matter that can best be decided by the judgment of the grower, as he knows the habits and bearing capacity of his vines. Frequently, two or even three or four shoots arise from each bud; few vines can support such growth, especially if it is fruitful, and at the same time remain healthy. Where more than one shoot occurs, the weaker should be removed, leaving the stronger one to bear the fruit. Two shoots to each spur should be sufficient for good cropping varieties as well as the less vigorous vines. Strongly growing varieties that are less fruitful may support three or even four shoots to each spur.

The second object of summer pruning is to remove completely all surplus or unwanted growth, including suckers and water-shoots that may appear anywhere from ground level to the extreme end of the vine. The only shoots which should be retained are those that can be utilized to fill in gaps between spurs and those arising about the base of spurs in cases where the spurs must be re-formed before they become too elongated or knotty. The removal of knotty spurs frequently necessitates the use of a saw and this may adversely affect the future development of the vine.

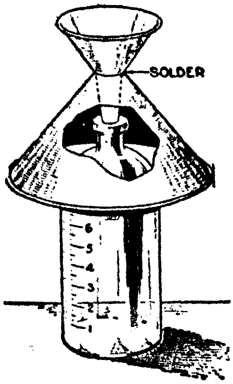
Time spent on summer pruning is not time wasted, because by regulating the crop and suppressing all undesirable cane growth many of the nutrients of the vine are thereby diverted to the more important parts, with the result that more handsome bunches will be produced, while stronger and better matured cane growth will be available for the following winter pruning.

◆

HOME MADE RAIN GAUGES.

This sketch indicates how a good rain gauge can be made from a graduated bottle and two tin funnels. First remove the spout of the larger funnel and insert that of the smaller one into the opening and solder where indicated. Then place the spout of the small funnel in the neck of the bottle.

In order to determine the amount of rain, the bottle should be marked in fractions of an inch. This can be done with a file or by marking a scale on paper and gluing it to the glass; then coating it with varnish.

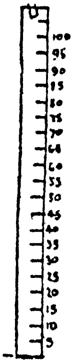


The diameter of the funnel should be the same as the inside of the bottle and the sides of the bottle must be parallel.

Bearing this in mind, any straight-sided bottle or receptacle will do, no matter whether round or square, provided the funnel is the same shape as the bottle or tin.

Of course, if an accurate measure is required, it is better to fix a small upright band around the outside edge of the upper funnel in order to prevent the raindrops from splashing out.

The above gauge will give a rough estimate of the fall, but if a finer estimate is required, obtain a piece of 1-inch glass tube as shown in the right-hand diagram, in which to pour the water from the other gauge.



Measuring Glass.

Twenty-five inches in a 1-inch glass gauge (inside diameter) represents 1 inch of rainfall. It is then an easy matter to divide up this 25-inch tube into separate parts as shown. This scale can be marked by painting a strip of enamel down the tube and cutting the marks with a knife.

Another method of measuring is to obtain an ounce medicine glass with a funnel four and seven-tenths in diameter, as this will be needed in order that 10 points of rain on this surface will equal 1 ounce of water.

There is actually no necessity for the inverted funnel as shown in the accompanying sketch as a funnel inserted into the bottle or tin will do provided, of course, it is a good fit and allows no outside water to run into the bottle.

Also the object in having a funnel at all is mainly to prevent evaporation between showers. To read the gauge, hold the bottle between thumb and first finger with the water at the level of the eyes.

From "Handy Farm and Home Devices and How to Make Them."
(J. V. Bartlett for War Blinded Association, Adelaide, S.A.), 1946.

ANT PROTECTI

Control of the Leaf-Miner in Tobacco.

R. C. CANNON, Assistant Entomologist.

THE tobacco leaf-miner* has been recognized as a serious pest since the introduction of flue-cured tobacco-growing in northern Queensland. It also attacks potatoes—growers know the insect as the potato tuber moth—tomatoes, egg fruit and other plants of the same family. The larva usually feeds in the leaves and may attack tobacco plants at almost any stage of growth. Infestation of plants in the seed-bed may restrict plantings, while infestation of young transplants may seriously impair the stand in the field. Attacks on older plants in the field either considerably reduce the value of the commercial leaf or render it unfit for marketing. The importance of the pest varies from season to season, the heaviest losses usually being sustained in dry periods when growth is slow.

Description, Life History and Habits.

The adult (Plate 84; fig. 2) is a rather inconspicuous, mottled brownish-grey moth, about half an inch in length, with the wings folded over the body when at rest. The moths are usually inactive during the day, when they may be found sheltering in shaded positions, and, if disturbed, rarely fly more than a few yards. Activity commences about dusk and flight continues for several hours, during which egg-laying takes place. The period of egg-laying lasts about three weeks, and a single female may lay several hundred eggs. The smooth, oval, white, iridescent eggs (Plate 84; fig. 1) are usually laid singly on young seedlings, the lower leaves of larger plants, and on the soil near the base of the plant. The incubation period varies with temperature, but in the warmer months in northern Queensland, eggs hatch in about 5 days.

The newly emerged larva, which is only about one-twentyfifth of an inch in length, is colourless to pale pink, with a dark brown head. As it grows, the body-colour changes to grey or yellowish-pink and the mature larva (Plate 84; fig. 3) attains a length of about half an inch. On emergence, the young larvae wander about for some time without feeding, until finally they enter the leaf and commence mining. In doing so, they discard the small piece of surface tissue cut away when the mine is initiated. Mines may occur on any part of the leaf blade but are generally situated near the base of the leaf and adjacent to the midrib or a main vein. Several mines may occur in one leaf. During the period of feeding within the leaves, the larvae produce mines which are irregular in size and shape, and almost colourless. In seedlings, a single leaf may not provide sufficient nourishment for the larvae in it and feeding may then take place in adjacent leaves connected by a silken tunnel. Otherwise they only leave the original mines when forced to do so by the death of the leaf in which they are feeding or some such cause. In heavily infested crops, the larvae may attack the stems either directly or through the base of a leaf. In such cases they remain in the outer, green tissues and do not enter the central part of the stem.

---

* *Gnorimoschema operculella* Zell.

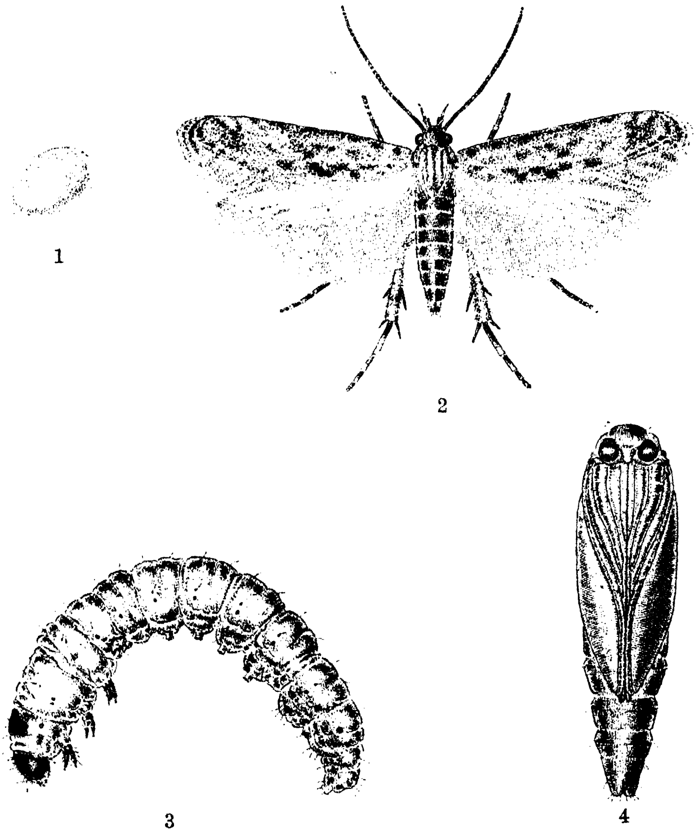


Plate 84.

TOBACCO LEAF-MINER: Fig. 1—Egg x 25; fig. 2.—Adult x 5; fig. 3.—Larva x 7; fig. 4.—Pupa x 7. [*Drawings by William Manley.*

When fully fed, after a period of about a fortnight, the larvae desert the mines and spin silken cocoons covered with small particles of earth, debris, or grains of sand. The cocoons formed by larvae developing on a mature plant are frequently found on the plant itself, but when development takes place on small plants in the seed-bed or in the field the cocoons are usually situated on the soil near the stem. Within the cocoon the larva ceases to be active, shrinks somewhat, and pupates within a day or two. At first the pupa (Plate 84; fig. 4), which is about one-third of an inch in length, is light-green in colour but soon darkens to brown and eventually it becomes almost black by the time the adult is ready to emerge. In summer the adult will emerge in about a week and egg-laying may commence within 24 hours of mating.

Seasonal History.

In northern Queensland, the duration of the life cycle ranges from three weeks in summer to seven weeks in winter and it is possible for ten or eleven generations to be produced in one year. In cooler parts of the State the life cycle would be longer and there may be fewer generations each year. As the pest has a wide range of hosts, both cultivated and native, and as crops such as tomatoes and potatoes are grown during the winter months in northern areas, continuous breeding takes place throughout the year, though moth populations are relatively low during the cooler months.

Injury to the Plant and Effect on the Crop.

The leaf-mining activities of the larvae may so reduce the effective leaf area of seedlings that they are unable to make normal growth. In young seedlings, the larvae may tunnel into the midrib of the young leaves and into the terminal growth; in either case, the affected seedlings are of little value, as few of them would survive transplanting. Sometimes seed-beds may be totally ruined by the pest. Seedlings affected at a later stage in growth may not be completely destroyed but they are always more difficult to establish in the field. After transplanting, there is a period of relatively slow growth until the root systems become established in the soil and it is during this period that heavy losses of transplants are to be expected with leaf-miner infested seedlings. Similarly, an attack immediately after planting out is likely to seriously impair the stand, especially if the period of slow growth is prolonged by dry weather. If the outbreak in the field occurs after the transplants have resumed vigorous growth, the risk of total destruction is considerably reduced, though some damage to commercial leaf may be expected.

Plate 85.

TOBACCO LEAF-MINER.—Damaged leaf.

In the field, the lower leaves are usually the first to be attacked and the damage extends upwards, the upper limit being determined by the severity of the outbreak. Frequently several mines are initiated in the one leaf and these increase in size as the larvae feed until they may meet and coalesce. Leaves so damaged (Plate 85) are considerably reduced in value and may even be rendered unsaleable. A less obvious effect of this type of leaf-miner injury is the reduction in plant vigour which lowers the yields of commercial leaf.

During severe attacks, mining sometimes occurs in the main stem of the plant. These mines appear as slightly raised bands, about one-eighth of an inch wide, and may completely encircle the stem, usually near ground level. They interfere with the nutrition of the plant and weaken the supporting tissues of the stem. Plants damaged in this way are frequently blown down by moderate winds.

Control Measures.

Since the leaf-miner does not feed externally, control by the use of stomach poisons such as arsenate of lead is difficult. D.D.T., which acts as a contact insecticide and only slowly loses its toxicity on exposure, has proved more satisfactory. Good control of the leaf-miner in tobacco can be achieved by the use of D.D.T. as a 0·1 per cent. spray or a 2 per cent. dust. Although there is as yet no experimental evidence available on the point, there is every reason to expect that D.D.T. will give comparable control of the stem-borer.* It is compatible with copper fungicides, which may be required in seed-beds, and can be mixed with them to form combined sprays or dusts.

In the Seed-beds.—As seed-beds are watered frequently, dust residues might be washed off the plants fairly quickly, and for this reason spraying is preferred. The first application should be made when the seedlings are 10 to 14 days old and repeated at fortnightly intervals thereafter. D.D.T. will satisfactorily control most other insect pests in the seed-bed so that it should be unnecessary to apply any other insecticide. The applications should be so arranged that the final seed-bed application is made just prior to transplanting in order to protect the seedlings for the first two weeks in the field.

In the Field.—Provided the seedlings were treated just prior to transplanting, a fortnight may elapse before the first field application is made. Two more applications at three-weekly intervals should be sufficient to give control under most conditions. Should there be a particularly heavy infestation, or should mining become apparent within a lesser period, then the period between treatments may be reduced to two weeks. Though D.D.T. may destroy leaf-miner larvae within the mines, growers would be well advised not to wait until the injury is conspicuous before applying the insecticide. In treating plants in the field the insecticide should be applied to the whole of the plant as it will also give some control of other insect pests. There is experimental evidence to suggest that the spray will also check the tobacco budworm† and the green loopers‡.

From 24 to 36 gallons of spray or 12 to 48 pounds of dust per acre will be required for each application, depending on the size of the plants at the time of treatment. Good results have been obtained with both sprays and dusts, though sprays may be slightly more persistent than dusts.

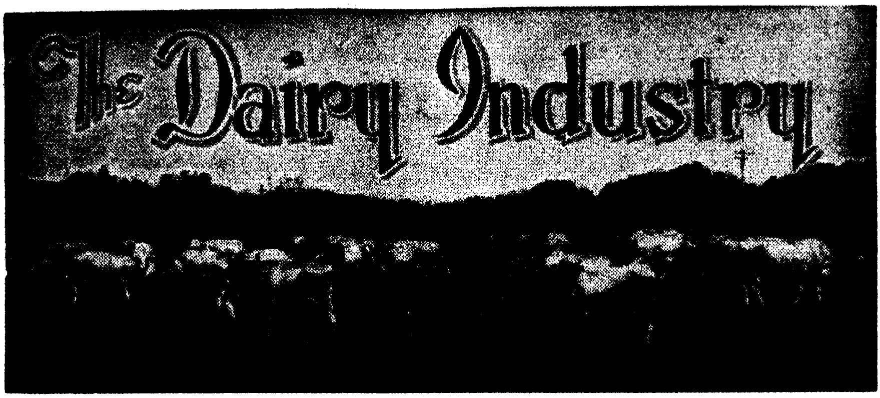
General.—In order to reduce the carry-over of this pest on other hosts, winter breeding grounds should be eliminated as far as practicable. Old tobacco stalks should be uprooted and destroyed immediately after harvesting, together with any adjacent weed hosts. Where other susceptible crops, such as potatoes and tomatoes, are being grown appropriate control measures should be applied. Attention to these cultural practices may prevent the leaf-miner population from reaching high levels.

---

* ***Gnorimoschema heliopa*** Low.

† ***Heliothis armigera*** Hbn.

‡ ***Plusia argentifera*** Gn. and *P. chalcites* Esper.



Improvement of Cream Grades.

V. R. SMYTHE, Dairy Technologist.*

THE warming up of the weather has produced a rather sudden drop in milk and cream quality. In the case of milk this has been shown by an increase in the number of suppliers' milks which fail to reach the required methylene blue standard. With cream this warmer weather has resulted in an increase in gradings down, particularly where deliveries to the factories are no more frequent than, say, three times weekly.

The effect of increased temperature on milk and cream quality works in two ways. In the first place, warm weather means that bacteria lurking on improperly sterilized utensils may multiply rapidly under the warm conditions, with the result that milk is more heavily seeded in passing through milking machines, through vats and pipes and strainers and over coolers. Cans and buckets, too, may contribute to contamination. Then, secondly, warm weather means a higher storage and ripening temperature for the cream in the dairy, with ample scope for bacterial spoilage, which gives undesirable taints and flavours.

It is true that, provided cream is produced cleanly and hygienically, the only factor which will cause undesirable types of ripening will be high storage temperature, particularly when cream has not been quickly cooled immediately after separating. What happens is this: Cream which is cleanly produced still contains considerable numbers of micro-organisms, usually with the souring type predominating. As the temperature rises above 60 degrees, the tendency is to favour the development of undesirable types before they can be suppressed by the acidity of the souring cream. This results in taints which the cream grader refers to as unclean souring.

The importance of rapid cooling of cream cannot, of course, be over stressed. If such cooling is practised assiduously, and the cream is kept cool, it will do more to raise cream grades than any other treatment on the farm.

---

* In a Country Hour broadcast talk, by courtesy of the Australian Broadcasting Commission.

Cream Ripening.

The subject of cream ripening has received a lot of attention in every country where dairying is extensively practised, and it is realized that a well soured, properly ripened cream yields a butter with considerably more flavour than sweet cream. This is made use of in some countries of the world, particularly in Europe, where a highly-flavoured butter is favoured by most consumers. The procedure is to inoculate the cream with a starter culture of pure lactic souring bacteria, and allow the acidity to develop to the required degree before it is stopped.

Blending and Stirring.

Both blending and stirring of cream done correctly and carefully can considerably improve cream quality. Where under very dry conditions, as at present, production is low and cream deliveries to the factory are made only twice or three times weekly, cream has to stand in the dairy for days. The fat rises to the top, leaving a milky layer below which sours and clots. This can produce a layer of curd on the bottom of the can, and such cream will, of course, be degraded as curdy to second grade. If only to prevent this happening stirring will be of great benefit, but it should be done with a properly constructed metal stirrer. Pieces of wood should not be used.

Stirring may be helpful in another way, too, by allowing aeration of the cream, though the benefit which accrues from this is hard to assess and is not as important as the preservation of even texture throughout the bulk of cream. Any undesirable taints from fermentations, of course, cannot be dispelled by removing some of the gases, because these taints are absorbed by the fat in the cream.

The blending of cream on the farm is for one purpose, that is, to make use of a properly-soured cream to start off the clean souring of another. Blending has to be done to some extent for transport to the factory, but its effectiveness depends on the proper ripening of the older cream, and it would be foolish to attempt to blend a fresh cream with an older one which has not ripened cleanly. This would result in both lots being degraded. Furthermore, in no instance should cold and warm creams be blended. Both should be well cooled before any attempt at blending is made. It is anticipated that when, and if, refrigeration becomes available on dairy farms, blending before storage will become necessary only to economise space in the refrigerator cabinet.

The Health of the Dairy Herd.

Another aspect of cream quality is too important to omit, and that is the health of the cows. Quite recently contagious pleuro-pneumonia has been found in several herds supplying Brisbane with raw milk. Pleuro had not been known in the district for thirty years. The disease was not at first recognised, and was confused with three-day sickness. In almost every instance when the milk from cows sickening of the disease was included in the bulk, the milk was rejected by the factory grader because of a strong taint. If this taint was present in the milk it almost surely would be evident in the cream also. This is mentioned to emphasise the importance of the health of the stock in relation to cream quality. The dislike which all graders have for mastitis or mammitis milk is well known, and any cow with a swollen infected quarter, or whose milk shows the presence of clots, slime, or blood, should be immediately segregated, milked last, and her milk rejected from the bulk.

The deterioration in cream quality observed during July may be taken as an indication of what may occur during the forthcoming summer. A defect hardly noticeable now will become greatly magnified under warm weather conditions. In order to produce cream of the highest possible quality these points should be kept well in mind:—

Do not use colostral milk. At least a week should elapse after calving before including the milk in the bulk and longer if the milk is not normal.

Do not keep on milking cows when they should be dried off.

Reject the milk from mastitis quarters.

Use boiling water or steam for sterilising utensils.

Cool cream immediately after separating and keep it cool.

And lastly, be careful when blending creams.

◆

MASTITIS CAN BE CHECKED.

Veterinary advisers say that most cases of mastitis which occur on a dairy farm are contagious or catching. Not only may mastitis infection be transmitted from cow to cow by the milker's hands and by milking machine parts, but it may be transmitted indirectly.

Milk from an infected udder spilt on the floor of the milking shed, or splashed on brooms or shovels used by a milker who has just milked an infected cow, or other articles of equipment, or allowed to contaminate bail partitions, may cause contagion. In fact, any infected material on or in any part of the milking shed may be a means of spreading mastitis.

Therefore, when any form of mastitis is present in a dairy herd, the cow or cows which have the disease should be isolated. Mastitis-infected cows should be hand milked, preferably in bails away from those used by the healthy cows. Cows with mastitis should be milked after the rest of the herd, and the milker should wash his hands thoroughly in a disinfectant solution after he has finished milking.

The milk from a mastitis cow should be drawn into a bucket containing a disinfectant and certainly not, as is sometimes done, on to the floor. If these precautions are not scrupulously observed, mastitis may go quickly through a whole herd. As in everything else, prevention is always better and very much cheaper than cure.

Observations on Dairy Production in New Zealand.

E. B. RICE, Director of Dairying.*

(*Continued from page* 160, *September*, 1946.)

Sheds and Yards.

Dairy yards and sheds were observed to be fairly sound structures, though not elaborate or costly. A plan of every shed is required to be submitted for the approval of the local officer of the Dairy Division and, similarly, any alterations must be approved. Every milking machine must likewise be installed in an approved way, and second-hand machines also must be approved before installation and use. A concrete assembly yard is provided on every farm to obviate the mud and dust problem in the vicinity of the milking shed. The "walk through" shed is employed almost without exception. Water is laid on for washing down of floors, cleaning utensils, cooling of milk or cream and use in an electric water-heating appliance. A concrete race for exit from the sheds is a fixture on many farms, and frequently the entry lanes from the pasture paddocks to the cowyard are provided with a narrow concrete strip. Cows will always walk along this concrete strip in wet weather, so minimizing the pugging of the lanes. Milk and/or cream are stored in the milk room or a platform adjacent to the shed; isolated dairy houses of the Queensland type do not exist. An electric water heater, or other approved means of supplying hot water, is compulsory in the milking shed.

Concrete posts for fencing are being increasingly used, as supplies of timber for this purpose are diminishing and are costly.

Electrical Installations.

New Zealand is well equipped with hydro-electric power and it is proposed to considerably extend these services. Rural electrification, which has undoubtedly been a great boon to farmers generally, is being made full use of in New Zealand. Electricity is available on almost every farm for driving the milking machine, heating water for washing up of utensils and for domestic use in the farm home for cooking, lighting, refrigeration, washing machine and radio.

Use of Hedges.

A feature of the New Zealand rural scene which at once impresses itself on the visitor is the use of hedges. These are grown along main boundary fences and often along sub-divisional fences to provide shelter for the stock from the cold winter winds and shade in summer. The general appearance of the property is also made more attractive. The chief hedge plants grown are Lawsoniana, Barberry and African Boxthorn.

Water Supply.

Water abounds in the dairying districts, and is ample for all purposes, both in the shed and for the watering of stock. Water is reticulated to troughs in the different paddocks. Apart from the plentiful supplies from running streams, underground supplies are usually available at comparatively low depths and on many farms visited there were bores, equipped with electric pumps.

Machine Milking.

Machine milking is practised more extensively in New Zealand than in any other dairying country. It is estimated that 87·5 per cent. of dairy cows are milked by machine and that 31,500 milking machines are in use. Machines fitted with a low level milk line about one foot off the floor of the bails are used in many sheds. Because of the lower vacuum pressure which may thus be used, it was believed such installations would tend to minimize the incidence of udder disorders, but investigations, supported by the opinion of practical users, have not substantiated this claim. This is not to be construed as an indictment of low-line milkers; on the contrary, farmers questioned expressed satisfaction with this type of milker. A pump is, of course, necessary in such installations to elevate the milk to the milk vat. This additional potential contaminatory factor should not be overlooked.

Non-Stripping.

Enquiries were made from various sources as to the extent of, and experience with, non-stripping of cows after machine milking. Although the practice gained stimulus in war years, it is not widespread. Possibly 15 per cent. of farmers do not strip. Consensus of opinion among farmers who have adopted it and research workers is that non-stripping is a worthwhile practice, and that 90 per cent. of cows will milk out freely without hand-stripping if the milking machine is in sound mechanical order and is efficiently operated. This accords with Queensland experience in the non-stripping technique. A New Zealand investigation has suggested the possibility of inheritance causing some cows to fail to milk out fully by machine. It was observed that the daughters of some bulls always required hand-stripping to get all milk out of their udders.

Farm Homesteads.

The dairy districts in New Zealand have passed beyond the developmental stage, so most farmers have been able to provide comfortable housing. Farmers now enjoy in their homes most of the amenities of city residents. Farms are, too, usually served by good secondary roads. The intensive dairying on the North Island has, of course, tended towards farms being in relatively close proximity to dairy factories and towns. For instance, the manager of one co-operative milk and cheese factory with a daily intake of 23,000 gallons of milk stated that the supplies were drawn from within a distance of three miles on three sides of the factory and seven miles on the fourth side. On the day of our visit, another cheese factory received 6,100 gallons of milk from 31 suppliers, all within three miles of the factory .

Share Farming.

Share farming, or as it is called in the Dominion, share-milking, is operated in three ways:—

1. Probably the most common system is for the farm owner to provide the farm, herd, implements and equipment. The share-milker, who obtains one-third of the gross returns, is responsible for the milking and care of the herd, as well as for farm maintenance.

2. The share-milker provides his own herd and receives half of the gross income from the farm.
3. The owner provides everything as referred to in (1) and, additionally, is responsible for any cropping and the farm maintenance. The share-milker in this system has to do the milking and incidental dairy shed work only. He receives in return one-fourth of the gross earnings.

Farmers' Veterinary Clubs.

Some co-operative dairy associations have for some years employed veterinarians to assist in the improvement of the health of their suppliers' herds and this system is extending. The Dominion Federation of Farmers' Veterinary Services has now been incorporated. Its main purpose is to ensure a uniform and sound basis for the constitution of new groups. The clubs are financed by each producer authorizing the factory to deduct from his milk or cream cheque a levy on a cow or butterfat basis. A charge, usually 7s. 6d., to cover mileage travelled by the veterinarian, is fixed for each visit made.

Herd Improvement.

The New Zealand Department of Agriculture states that the improvement of dairy stock in the Dominion has proceeded in four main stages:—

1. Before 1920, when concentration on the use of pedigree sires was the main method.
2. From 1920 to 1940, when selection on both male and female sides has been aided by records of production of butterfat of both pedigree and grade cows obtained from a nation-wide, co-operatively organised herd recording system and a State aided system for pedigree cows only.
3. Since 1940, when recording was extended to the male side with the organisation of a sire survey service, for the purpose of locating bulls of proven capacity to sire high producing progeny.
4. The period now commencing, when artificial insemination is being employed to permit the more extensive use of proven sires.

The necessity for some system of measuring butterfat production of dairy cows in order to effect improvement through breeding was recognised early in the Dominion. The first organised system was instituted by the Department of Agriculture among a group of dairy farmers in 1909. This was similar to the scheme now in existence in Queensland. The farmers weighed the milk of the cows in their herds, took samples and sent them to a butter factory or departmental officer for estimation of butterfat content. The farmer's sample testing scheme served the industry well in the beginning and enabled farmers to appreciate the merits of testing. However, the rapid progress in machine milking caused difficulties for the farmer who continued to do his own weighing and sampling, so the group herd testing system was commenced in 1922. Thenceforward the numbers of herds under test was greatly increased. Under this system herd testers are employed, each tester handling about 25 herds. He visits the herds in rotation once monthly, weighs and samples the milk and carries out the butterfat test by the Gerber or Babcock method. Under the New Zealand group herd recording system all clerical work is done in each association's office.

After the introduction of grade herd testing, the necessity for improved production bred sires soon led to a system for recording the production of pedigree stock. The first system was inaugurated in 1912 and another system was adopted in 1927. The different systems for production testing of pedigree and other stock are outlined below.

Testing of Pedigree Dairy Cows.

The New Zealand Department of Agriculture controls the systems of testing pedigree dairy cows. These systems are known as the Certificate of Record Testing, and Government Official Herd Testing. The Certificate of Record Testing, started in 1912, provides for cows registered in the New Zealand Herd Book of the several breed societies. This system resembles in most respects the systems of testing of pure bred dairy stock in Australia, but while in the Australian advanced register testing systems the testing extends over a 273 day period, the New Zealand Certificate of Record Tests are in two divisions, namely, the 365 day or yearly test and the 305 day or ten-month test.

Testing is done by officers whose duties comprise solely Certificate of Record and Government Official Herd Testing. They make a surprise visit to the farm once monthly, checking the milk weights and taking samples for butterfat testing. The owner must also weigh and record the milk yielded at every milking. Strict identification of cows by the testing officer at each visit is insisted upon. There are prescribed conditions with respect to calving dates after test and butterfat yield for the award of certificates. The testing fees are £8 8s. for the first cow entered by a breeder each year and £3 3s. for each subsequent entry in that year.

The Government Official Herd Test, which was commenced in 1927, is really complementary to the Certificate of Record Test. Its object is to enable stud dairy cattle breeders who test one or more cows by the Certificate of Record System to have all other pedigree cows in the herd production-tested. The fee is 5s. a cow. Testing is done by the officer at the same time as he carries out the Certificate of Record Testing each month and the test is conducted over 305 days. No specific provision is made in respect of calving or production standards or the weighing of cow's milk yields at each milking. A composite sample is used for butterfat estimation. The monthly butterfat production is computed from the weight of milk and fat test on the day of the testing officer's visit and the season's yield by adding up the monthly estimates.

Group Herd Recording.

This system was introduced in 1922 to replace the previous system whereby the farmer weighed and sampled the milk of his herd. As previously stated, the extensive use of the milking machine in New Zealand was largely the reason for the necessity for the farmer being relieved of weighing and sampling milk. Although primarily intended for the testing of grade herds, membership of a herd improvement association, as the organisations controlling group herd recording are known, is not restricted to owners of grade herds; in fact, a high proportion of the cows under group test are pure bred, including those of some of the more progressive breeders who appreciate the valuable guidance of sire surveys, prepared by the Dairy Board from group herd testing results, in maintaining or improving herds already well above average productivity.

The control of group herd testing in New Zealand comes under the New Zealand Dairy Board, which defines the policy through the Herd Recording Council.

Before the Dairy Board assumed control of group herd testing in 1936, there were some 27 individual herd testing associations in operation, and all were affiliated to a Dominion Group Herd Testing Federation which controlled policy matters. The weakness was that the Herd Testing Federation had no statutory powers, and there was nothing to prevent private individuals setting up in opposition to herd improvement associations. Since the establishment of control by the New Zealand Dairy Board, the six herd improvement associations operate under an annual license issued by the Board, and this can be revoked at any time in the event of an association failing to carry out its work in accordance with the policy laid down.

The following notes* deal with the operation of group herd testing, with particular reference to the activities of the Auckland Herd Improvement Association, which is the largest and tests roughly one-third of the total cows under test.

There are six herd improvement associations in New Zealand—five in the North Island and one in the South Island. There is not much dairying in the South Island, and one association covers the whole territory, with headquarters at Christchurch.

In the North Island one association, with headquarters in Whangarei, operates from the North Cape down to about 50 miles north of Auckland.

The next association, with headquarters in Hamilton, operates from about 50 miles north of Auckland down to south of Taumarunui, taking in the following dairying districts: South Auckland, Waikato, King Country, Thames Valley, Rotorua.

The third operates over the Bay of Plenty and East Coast, with headquarters at Whakatane.

The fourth covers Taranaki province, with headquarters at New Plymouth.

The fifth covers Wellington and Hawkes Bay districts, with headquarters at Palmerston North.

The scope of the associations ranges from 20,000 cows to 100,000 cows. Each association is an incorporated society incorporated under the *Incorporated Societies Act,* and is controlled entirely by the dairy farmers, who are testing members of the organisation.

A committee of management controls each individual association, and its members are elected by the testing members and by the dairy companies in the territory over which the association operates. The basis is 50-50 representation of testing members and dairy companies.

---

* Information supplied by Mr. S. J. Sheaf, General Manager, Auckland Herd Improvement Association.

As the associations do not operate for pecuniary gain, and are of an educational and scientific nature, they are not liable for any taxes.

Each association divides its territory into groups, the idea being to give a community of interest to the testing members. The groups are merely geographical and bear no relationship to the officers who are carrying out the work. The groups may therefore vary in size from, say, 10 herds up to 70.

The members of each group elect a group committee at the annual district meeting, and the group committee holds office until the conclusion of the following dairying season, the group committees being elected in March and April each year.

The object of a group committee is to act as a connecting link between the management and the members, but in practice its duties are very light, and it is seldom called on by the management. It can, however, be of considerable use to a new testing officer in explaining district conditions, drawing up testing routine, and giving advice concerning the care of horses, and in other ways.

There is no annual general meeting of members, but the annual meeting consists of the conveners of the various group committees or their proxies. The group commitees vary in number from two to six according to the size of the group, and the convener is appointed by the members themselves. In practice, because of small attendances at many district meetings, the group committees are frequently appointed by the management committee under its constitutional powers.

Finance.

An annual Government subsidy was paid during the seasons 1927-28 to 1934-35. Apart from that subsidy, all the income derived by the herd improvement associations came from their testing members in testing charges for the work performed. When the Dairy Board took control, the Government subsidy, as such, was discontinued, but the Dairy Board has paid each association annually grants under certain headings for services actually performed by testing members through their associations for the benefit of the dairying industry as a whole. The grants have varied from season to season, and the Dairy Board increased its levy on dairy produce to finance the Dairy Board herd improvement plan which was put into effect in 1939-40. The Government makes an annual contribution because of the national importance of herd improvement work, and this is paid to the Dairy Board, for which allowance is made when grants are provided for individual associations.

Herd improvement associations receive a clerical grant of 10s. per herd and 6d. per cow tested, in consideration of the data collected. This clerical grant is retained, of course, by the associations.

A small herds grant is also allowed to enable associations to keep down the cost of testing to the small dairy-farmers. The grant is on the basis of £3 10s. for a herd of 20 cows, diminishing by 3s. per cow for each cow over 20 and under 44, the grant ceasing at 44 cows. This small herds grant is also retained by the association.

A successive recording grant on the basis of 10 per cent. of the testing charges is made to members who have tested for three or four years in succession, and this grant is deducted from members' testing fees.

The Dairy Board also makes a payment to associations of 60 per cent. on testing fees for returned servicemen in their first year of testing, provided they have served overseas during the 1939-45 war. After the first year 40 per cent. discount is allowed for the second successive year, and 10 per cent. for the third successive year, which means one year's free testing in three. This grant, however, is subject to annual review because of its having a snow-balling effect.

Income from Testing Fees.

The greater portion of associations' incomes (approximately 80 per cent.) comes from the testing fees paid by members, and approximately 20 per cent. from the Dairy Board grants. The Dairy Board granted a special additional "war costs allowance" of 60 per cent. and 40 per cent. in 1943-44 and 1944-45 respectively. The average cost of carrying out the work of the associations last season was about 6s. 9d., and the average testing charge to the farmer was 6s.

The average size of the herds tested is about 60. The testing charges are based on a herd fee payment, plus a per cow charge according to the size of the herd. Most testing members pay their testing fees by an irrevocable order on their dairy company cheques. Herd testers' wages account for over 50 per cent. of the expenditure and office salaries for about 20 per cent. Every member is required to sign a membership form with an order form attached, agreeing to be bound by the rules set out in the regulations and also by all the rules issued by the Dairy Board.

Herd Testers.

All herd testers commence as junior officers, some of whom have taken the herd testing course at Massey College. These juniors work under the control of a senior officer at one or other of the five central testing training depots. They simply weigh and sample the milk, and then send or bring their samples into the depot, where the testing is actually done by the depot officer. The depots are attached to a factory, and testing at the depots is carried out by the Babcock method, with the exception of one depot where there is an electric Gerber. The juniors assist the depot officer when they are in the depot, and thus learn the testing procedure.

All promotions are made from the ranks of the juniors, and a testing officer is in charge of his own district of 26 herds, and does the whole of the weighing, sampling and testing. All testing carried out other than at the five depots is done on the farm by the Gerber method. Approximately one-third of the staff are juniors working at the depots, and two-thirds are testing officers testing in the field. Their other duties include tattooing of calves and collection of mastitis data from those farmers who are prepared to co-operate. (The number of farmers co-operating varies from 33½ per cent. to 70 per cent.) Collection of this information is based on members' shed observations of cows suffering from udder trouble. Particulars of all cows leaving the herd—i.e., through cullings and deaths—are collected right through the season by the herd tester entering on the rough sheets the specific reason for cullings, or the specific cause of deaths. Particulars of all cows leaving the herd between the member's last test in the old season and his first test in the new season are obtained by recording the information on a special winter wastage form.

Herd testers collect from every member during the months of August to February (inclusive) the number of cows actually milked at the time of their monthly visit, together with the number of cows on the farm, for the purpose of ascertaining the effective average production per cow.

All herd testers are expected to advise members to have their bulls *surveyed, but it has been found from experience that direct contact from head office with the member usually gives better results in actually* getting the information. Herd testers, however, are always told of the names of members from whom they should endeavour to obtain surveys. Full details of the system of sire surveys of bulls and merit register classification of cows are obtained.

Herd testers send to the head office their rough sheets showing the p.m. and a.m. milk weights, together with the tests for every cow.

All calculations are made at head office, and a typed test sheet is forwarded direct to the member, usually the day after the receipt of the member's rough sheets. Members are entitled to a carbon copy of the rough sheets showing the milk weights and tests. The record kept at head office is an exact duplicate of the sheet sent to the member, and it is also pasted in a folder in exactly the same way as the member's test sheets.

Members' seasonal testing returns are not filed together under the name of the member, but are filed each season in their respective groups. This method has been found the most satisfactory as all statistics are based on groups.

Intermediate and Lifetime Merit Registers.

Members with registered pedigree cows in their herds are advised to enter their animals which have qualified in either of these registers. To qualify for the lifetime merit register, a cow must produce a minimum of 2,500 lb. butterfat in not more than eight seasons.

For the "Elite" class, a cow to qualify must produce not less than 4,000 lb. butterfat in not more than ten successive years. Only 79 cows in New Zealand have so far qualified.

To qualify for the intermediate merit register, a cow must produce 1,200 lb. butterfat in the first three lactations; reduced to 1,150 lb. for a cow which first calved under 2½ years.

Sire Procuration Service.

The Auckland Association issues an annual bull catalogue with a view to inducing intending purchasers of herd sires to buy the bull on the farm.

Consulting Officers.

The Dairy Board appoints a consulting officer to each of the herd improvement association's territories, and they are under its direct and complete control. Their work brings them into close contact, however, with the management of the herd improvement associations, and they co-operate fully in the activities of the individual associations. The consulting officers each possess a degree in agricultural science or a diploma from a dairy college.

A review of the work of its herd improvement department is published in each annual report of the Dairy Board. Undoubtedly its progressive policy and work is making an important contribution towards raising the standard of dairy husbandry in New Zealand.

A few informative extracts typical of many contained in these reports follow:—

"The bull is important as approximately 12 to 15 heifer calves will be sired by the average bull annually, and as he has a working lifetime of about three to four years, it follows that some 40 to 50 heifer calves would be available from the average bull as compared with two or three heifers from the average cow. Therefore the bull is about twenty time more important than the average cow in determining the quality of future generations of dairy stock."

"You will spend five years milking the daughters of your herd sire."

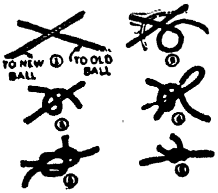
"The next best bull to a proven bull is the son of a proven bull from a line of sound female ancestors."

"It pays to insist on a series of butterfat records for the dams" (of bulls).

In 1943 the Dairy Board appointed a sub-committee to make a critical review of sire survey work and herd improvement through breeding. An illuminating report was presented.

[TO BE CONTINUED.]

HINTS ON JOINING BALL TO TWINE SUPPLY.

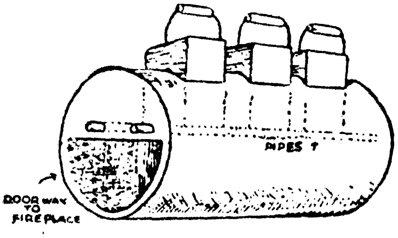


This is one useful way of joining a new ball of twine to the twine supply in the binder.

If you are not used to this method just try practising the knot illustrated in figures 1 to 6 in these drawings.

It is quite a good procedure and one found very successful by quite a number of farmers—it being quick and very effective.

A USEFUL METHOD FOR HEATING WATER.



First take an empty drum and at one end cut a good large hole for a doorway.

Then get two ¾ in. pipes, and run them through the centre of the drum from end to end, placing them about 6 in. apart.

Next, cut three square holes in the top of the drum to allow the buckets to come down and rest on the pipes. A good fire can then be placed beneath the buckets of water which will rapidly come to the boil.

From "Handy Farm and Home Devices and How to Make Them."
(J. V. Bartlett for War Blinded Association, Adelaide, S.A.), 1946.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock, which qualified for entry into the Advanced Register of the Herd Books of the A.I.S., Jersey, Ayrshire, and Friesian Societies, production records for which have been compiled during the months of June and July, 1946 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	AUSTRALIAN ILLAWARRA SHORTHORN.			
	Mature Cow (Standard 350 Lb.).			
Trevor Hill Twinkle 2nd	G. Gwynne, Umbiram	11,126·62	421·980	Corunna Supreme
Alfa Vale Dandy 10th	W. H. Thompson, Nanango	11,075·4	401·002	Reward of Fairfield
Arolla Velvet 2nd	J. Crookey, Allora	8,891·5	390·837	Parkview Limerick
Wandegong Joyce 15th	J. Redhead, Indooroopilly	9,578·11	384·996	Alfa Vale Evidence
	Senior 4 Years (Standard 330 Lb.).			
Bileena Bonnie 8th	W. F. Hemmings, Warwick	11,013·25	378·346	Tara Governor
	Junior 4 Years (Standard 310 Lb.).			
Alfa Vale Model 22nd	W. H. Thompson, Nanango	11,841·0	484·888	Penrhos Pansy's Pride
Rosenthal Dove 25th	D. Robinson, Warwick	8,625·45	343·356	Rosenthal Perfection
	Senior 3 Years (Standard 290 Lb.).			
Bileena Buttercup 9th	W. F. Hemmings, Warwick	10,390·9	381·975	Tara Governor
Bunya View Dulcie	I. B. Skerman, Kainkillenbun	9,202·45	345·173	Trevor Hill Reflection
Sydmouth Nancy	T. Vayro, Flagstone Creek	8,257·8	329·476	Mount Blow Security
White Park Polly 25th	W. T. Savage, Barnesmore	7,746·2	316·079	White Park Ronald
	Junior 3 Years (Standard 270 Lb.).			
Rommoc Cinderella 3rd	N. J. Larson, North Bundaberg	9,823·0	459·629	Ronnoc Emblem
Wandegong Mayflower II.	J. Redhead, Indooroopilly	9,334·46	338·244	Alfa Vale Evidence
Royston Evelyn	P. R. Emery, Dallarnil	8,351·9	331·871	Sunnyview Royal Chief
Navillus Charm 17th	C. O'Sullivan, Ascot	7,534·15	308·255	Greyleigh Eros
Arolla Venus 3rd	J. Crookey, Allora	7,090·75	307·412	Parkview Highbrow
Ennismore Bessie	E. W. Jackson, Nobby	7,137·25	272·099	Navillus Prince Henry
	Senior 2 Years (Standard 250 Lb.).			
White Park Linnette 32nd	W. T. Savage, Barnesmore	9,034·1	332·582	White Park Skipper
Bingleigh Ettie 4th	J. C. Meier, Mount Mort	6,810·35	324·796	Blacklands Emblem
Aynesley Jane 4th	G. Francis, Kumbia	8,307·65	316·064	Alfa Vale Pride 6th
White Park Melba 23rd	W. T. Savage, Barnesmore	7,976·4	310·878	White Park Skipper
Fairthorn Pidgeon 12th	H. G. Watson, Killarney	7,357·2	298·872	Parkview Red Prince
Mt. Camp Coupen (236 days)	Madge Brothers, Southbrook	6,306·5	276·213	Rosenthal Red Major
Rhodesview Handsome 7th	W. Gierke and Sons, Helidon	6,446·95	273·188	Alfa Vale Nigel
Aynesley Gwen 5th	G. Francis, Kumbia	6,463·15	252·742	Alfa Vale Pride 6th
Wenlock Beauty 3rd	H. G. Watson, Killarney	6,032·4	250·099	Alfa Vale Repeater

Junior 2 Years (Standard 230 Lb.).

Bantry Rose	D. Sullivan, Pittsworth	9,170·36	375·454	Penrhos Blossom's Prince
Bingleigh Fanny 2nd	J. C. Meier, Mount Mort	7,048·15	323·567	Blacklands Jean Victory
Bingleigh Ettie 7th	J. C. Meier, Mount Mort	7,042·61	321·290	Blacklands Jean Victory
Trevor Hill Aster 4th (260 days)	A. H. Webster, Helidon	7,391·3	301·794	Balater Czar
Corunna Luster	H. L. and C. I. Bruggemann, Kulpi	7,606·15	297·049	Corunna Supreme
Sunnyside Gentle 50th	R. Moore, Kingaroy	7,330·45	291·117	Cosey Camp Isaac
Ennismore Freda	E. W. Jackson, Nobby	7,591·3	290·396	Navillus Prince Henry
Bingleigh Ettie 5th	J. C. Meier, Mount Mort	6,762·88	280·360	Blacklands Jean Victory
White Park Edna 30th	W. T. Savdge, Barnesmore	6,873·1	267·482	White Park Skipper
Navillus Gem (258 days)	C. O'Sullivan, Greenmount	5,744·0	253·930	Alfa vale Re Nell
Springlea Florrie 4th	J. E. Heath, Murgon	7,149·55	246·468	Alfa Vale Standard
Arolla Polly 8th	J. Crookey, Allora	6,005·4	240·365	Parkview Highbrow

AYRSHIRE.

Mature Cow (Standard 350 Lb.).

Leafmore Kits Daisy	J. P. Ruhle, Motley	9,912·7	453.261	Myola Jellicoe
Leafmore Selece	J. P. Ruhle, Motley	8,818·76	371·181	Myola Bessemer

Junior 3 Years (Standard 270 Lb.).

Myola Vestage	J. P. Ruhle, Motley	7,357·9	306·027	Leafmore Bonnie Boy

Senior 2 Years (Standard 250 Lb.).

Myola Marion	J. P. Ruhle, Motley	5,770·85	273·439	Myola Jellicoe

FRIESIANS.

Junior 2 Years (Standard 230 Lb.).

Tarata Whaka	D. Young, Kingaroy	8,901·65	313·551	Mahoe Wolseley
Tarata Frenola De Kol	D. Young, Kingaroy	8,439·0	303·226	Tarata Improver

JERSEY.

Mature Cow (Standard 350 Lb.).

Trecarne Chimes 5th	T. A. Petherick, Lockyer	9,772·45	485·692	Jerseylea Golden Duke
Westwood Volunteers Lotus	F. Porter, Maleny	7,008·9	443·475	Hunstrete Emperor's Volunteer
Carnation Blossom 2nd	T. Little, Clifton	7,798·35	423·234	Carnation Peers Laddie
Ashview Fancy	C. Huey, Sabine	6,725·75	408·737	Trecarne Butter Queen's Officer
Westwood Golden Dancer	F. Porter, Maleny	7,205·6	407·763	Westwood Emperor's Volunteer
Brookland Golden Drop	W. S. Conochie, Sherwood	7,321·25	406·267	Oxford Golden Peer
Westwood Barbara (258 days)	F. Porter, Maleny	6,856·35	402·073	Westwood Emperor's Volunteer
Brookland Choice Rose	W. S. Conochie, Sherwood	8,171·95	394·434	Brookland Choice Peer
Jersey Park Golden Thread	R. J. Browne, Yangan	7,985·8	384·470	Trinity Pioneer
Balwyn Ginger Lass	R. J. Browne, Yangan	6,908·5	375·493	Oxford Darby
Glenrandle Fair Lass	P. Kerlin, Killarney	6,698·55	350·459	Bellgarth Stylish

Senior 4 Years (Standard 330 Lb.).

Westwood Sapphire	F. Porter, Maleny	8,255·05	485·301	Westwood Palatines Volunteer

Junior 4 Years (Standard 310 Lb.).

Trinity Crowning Lady	Estate J. Sinnamon, Moggill	8,146·30	407·463	Trinity Crowning Effort
Fauvic Recoil (254 days)	H. Cochrane, Kin Kin	5,541·6	344·329	Shepstone Gallant Lad
Ashview Fashion	C. Huey, Sabine	6,777·8	315·546	Trecarne Victor 4th

PRODUCTION RECORDING—continued.

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	JERSEY—*continued*.			
	SENIOR 3 YEARS (STANDARD 290 LB.).			
Tecoma Duchess	H. J. Ellis, Kingaroy	7,184·4	379·582	Trinity Golden Royal
College Linda 5th	Queensland Agricultural High School and College, Lawes	6,918·75	331·93	Richmond Stalwart
Palen Blue Bird	Prison Farm, Palen Creek	6,578·65	312·324	Banyule Silvermine Oxford
Trecarne Toddles 4th	T. A. Petherick, Lockyer	4,922·75	305·470	Jerseylea Golden Duke
Kingsford Prim	J. W. Evans, Rosewood	5,251·8	291·714	Kingsford Reliance
	JUNIOR 3 YEARS (STANDARD 270 LB.).			
Westwood Dixie	F. Porter, Maleny	7,496·3	450·999	Westwood Combination
Glenrandle Nisa 2nd	P. Kerlin, Killarney	7,662·8	405·105	Bellgrath Stylish
Palen Guem	Prison Farm, Palen Creek	6,662·1	338·860	Palen Governor
Le Nid Pearl	W. C. Paroz, Biloela	5,158·1	275·305	Westbrook Aster's Lad 39th
Trecarne Some Eileen	T. A. Petherick, Lockyer	5,147·55	274·958	Trecarne Some Duke
	SENIOR 2 YEARS (STANDARD 250 LB.).			
Westwood Daydream	F. Porter, Maleny	4,430·8	304·266	Westwood Nobleman
Palen Golden Glow	Prison Farm, Palen Creek	5,889·2	285·524	Oxford Cardo
College Pearl 3rd	Queensland Agricultural High School and College, Lawes	5,700·15	264·703	Richmond Stalwart
	JUNIOR 2 YEARS (STANDARD 230 LB.).			
Brookland Cream Flake (365 days)	W. S. Conochie, Sherwood	8,649·95	507·583	Englorie Cunning Victor
Glenrandle Larkspur	P. Kerlin, Killarney	8,089·4	449·737	Bellgrath Glory King
Mayfair Star 3rd	J. W. Carpenter, Helidon	6,521·65	370·377	Trecarne Golden King 2nd
Lermont Duchess 2nd	J. J. Ahern, Conondale	5,748·35	356·674	Selsey Samares Hallmark
Brookland Merry Jingle Belle	W. S. Conochie, Sherwood	7,059·75	352·803	Bulby Maria Keepsake
Oxford Feodora (258 days)	Burton Brothers, Wanora	6,415·63	352·394	Oxfords Maids Victor
Westwood Locket	F. Porter, Maleny	5,693·75	342·446	Westwood Combination
Lermont Show Bell 2nd	J. Schull and Sons, Oakey	5,530·25	324·342	Lermont Peer
Glenrandle Fairy Queen	P. Kerlin, Killarney	6,261·4	318·580	Bellgrath Glory King
Oxford Leona	Burton Brothers, Wanora	5,958·01	310·116	Oxford Ajax
Oxford Fenella	Burton Brothers, Wanora	6,060·44	309·280	Oxford Ajax
Lermont Pearlie	J. Schull and Sons, Oakey	5,338·2	291·837	Lermont Peer
Trecarne Ryebread 3rd	T. A. Petherick, Lockyer	5,232·6	281·089	Trecarne Some Duke
Pinegrove Betty	J. W. Evans, Rosewood	4,678·5	273·115	Glenview Victor
College Tulip	Queensland Agricultural and High School College, Lawes	4,885·8	263·711	Richmond Stalwart
Ashview Locket 2nd	C. Huey, Sabine	5,429·75	258·507	Trecarne Victor 4th
Woodview Jerseygirl	P. H. Schull, Oakey	5,506·35	254·572	Woodview Officer
Ashview Milkmaid	C. Huey, Sabine	4,963·65	250·410	Trecarne Victor 4th
Lermont Shamrock	J. Schull and Sons, Oakey	4,515·0	246·843	Lermont Peer
Oxford Creole	Burton Brothers, Wanora	5,509·75	245·308	Oxford Winston
Tecoma Precious	A. L. Semgreen, Coolabunia	4,418·75	239·372	Tecoma Golden Royal

Plate 86.

Hereford Breeders in the Goondiwindi District.

Queensland Cheese Production 1945-46.

E. B. RICE, Director of Dairying.

THE production, yields and official grading results for all Queensland cheese factories during 1945-46 are submitted for the information of factory directorates and suppliers. Favourable seasonal conditions in the main cheese-producing district—the Darling Downs—for most of the year were responsible for the production of 12,023 tons of cheese, a production exceeded only by the peak output year of 1942-43.

Table 1 shows the effect of the increased demand for cheese in the war years in stimulating production in Queensland.

TABLE 1.

Year.	Tons.
1938-39	7,031
1939-40	6,179
1940-41	5,237
1941-42	7,292
1942-43	12,730
1943-44	10,733
1944-45	10,101
1945-46	12,023

Of the total manufacture of 26,931,781 lb. (12,023 tons) 18,250,974 lb. (8,148 tons), representing 67.8 per cent., was officially graded either for export or local sales.

The gradings are summarized hereunder:—

	Grade.		
	Choice and 1st.	Second.	Third.
Percentage	70.46	28.06	1.48

Despite expansion of the industry in the war years, and the then current disabilities on farms and in factories, cheese quality has shown a marked improvement in recent years, as shown in Table 2.

TABLE 2.

QUEENSLAND CHEESE QUALITY.

Year.	Grades.		
	Choice and First.	Second.	Third.
	Per cent.	Per cent.	Per cent.
1938–39	40·45	59·45 (2nd and 3rd)	..
1939–40	41·01	58·99 (2nd and 3rd)	..
1940–41	63·36	36·64 (2nd and 3rd)	..
1941–42	73·15	34·83	2·02
1942–43	73·17	26·32	0·51
1943–44	75·65	24·33	0·02
1944–45	72·6	26·39	1·01
1945–46	70·46	28·06	1·48

The above results may be regarded as a satisfactory sequel to a campaign for the rehabilitation of the cheese industry commenced in 1938, which involved the rebuilding and re-equipping of factories, intensive farm instruction, the further improvement of many factories during the cheese expansion drive in 1941-42, the systematic grading of cheese and improved technical services by the Department. Any further marked improvement can possibly be expected only if a system of compulsory grading of milk supplies is adopted. This forward move is supported by the industry, and voluntary milk grading schemes, by which differential prices are paid for qualified and unqualified milk, are operated by three Associations. Grading is carried out by the Methylene Blue Test.

Pasteurization of milk, which is most desirable for the manufacture of sound quality cheese, has increased notably in the past few years until at the present time only five small cheese factories are not equipped with a pasteurizer. The cheese produced in these factories is, with one exception, of unsatisfactory quality and the non-pasteurizing cheese factories contribute largely to the proportion of low grading cheese.

Although the manufacture of varieties of cheese, other than Cheddar, is of comparatively small quantity, nevertheless the manufacture and demand for these varieties is steadily increasing. In addition to Gruyere, Roman and Cottage Cheese, one factory has recently produced Gouda, a Dutch type cheese.

During the year whey separators were installed in three cheese factories for the recovery of butterfat from whey. Whey separation is proving economically sound and additional whey separators may be expected to be installed in larger factories.

The investigations on the manufacture of cheese from homogenized milk will continue during the year. Modifications in plant layout and treatment have simplified the technique. This product which does not exude fat at high temperatures is expected to prove very acceptable in warmer climates. The investigations were possible through the co-operation of the Queensland Butter Board and the South Burnett Co-operative Dairy Association, in whose Murgon factory the work was carried out and whose staff afforded every facility throughout the investigations.

RADIO TALKS TO FARMERS

(Australian Broadcasting Commission)

4QR AND REGIONAL STATIONS

THE COUNTRY HOUR—Daily from 12.15 to 1.15 p.m.

THE COUNTRYMAN'S SESSION—Every Sunday at 9 a.m.

Factory.	Milk. Received.	Production and Yield.					Gradings of Cheese.				
		Cheese, Green Weight.	Butterfat.	Cheese.	Yields.	Average Test.	Total Submitted.	Choice.	First.	Second.	Third.
				Per 100 Lb. Milk.	Per Lb. Butterfat.						
	Lb.	Lb.	Lb.	Per cent.	Per cent.	Per cent.	Lb.				
Aubigny	2,115,641	222,601	81,054	10·52	2·75	3·83	214·022	..	192,631 90·01%	21,032 9·83%	359 ·16%
Biddeston	9,173,871	971,321	341,694	10·59	2·84	3·72	729·285	..	704·480 96·6%	23·266 3·19%	1,539 0·21%
Coulstoun Lakes	1,731,307	174,395	65,300	10·07	2·67	3·77	16,047	..	..	7,536 46·96%	8,511 53·04%
Daredale	2,530,962	250,046	94,465	9·88	2·65	3·73	246,805	..	129·287 52·38%	104·459 42·32%	13,059 5·30%
Downs, Boodua	2,950,015	298,704	112,802	10·13	2·65	3·82	245,283	..	102,850 41·93%	139,426 56·84%	3,007 1·23%
Downs, Toowoomba	31,507,832	3,173,024	1,216,250	10·07	2·61	3·86	2,350,815	..	865,697 36·83%	1,366,788 58·14%	118,330 5·03%
Dundarrah	1,174,403	113,703	43,502	9·68	2·61	3·70	14,922	..	..	14,922 100·0%	..
Felton	6,117,051	674,770	222,738	11·03	3·03	3·64	371.315	..	328,464 88·46%	42,851 11·54%	..
Greenmount	3,047,898	369,563	129,306	12·13	2·86	4·24	195,973	..	25,095 12·81%	170,878 87·19%	..
Highgrove	2,631,611	271,628	101,379	10·32	2·68	3·85	217,212	..	1,890 0·87%	191,014 87·94%	24,308 11·19%
Irongate	5,315,143	582,344	206,755	10·96	2·82	3·89	511,068	2,101 0·41%	471,409 92·24%	36,118 7·07%	1,440 0·28%
Kelvinhaugh	2,311,708	247,308	90,311	10·70	2·74	3·91	292.914	..	242,049 82·63%	49,299 16·83%	1,566 0·54%
Kooroongarra	4,989,515	522,445	184.192	10·47	2·84	3·69	508,386	6,840 1·35%	380,409 74·83%	120,492 23·70%	645 0·12%
Lilyvale	3,326,026	362,024	129,512	10·88	2·80	3·89	354,560	..	280,812 79·20%	73,748 20·80%	..
Maclagan—											
Maclagan	10,145,002	1,051,704	385,755	10·37	2,73	3·80	706,152	..	530,288 75·10%	165,969 23·50%	9,895 1·40%
Kulpi	8,088,720	827,037	306,895	10·22	2·69	3·79	833,026	2,720 0·33%	437,400 52·51%	384,519 46·16%	8,387 1·00%
Malling	6,739,751	683,319	256,326	10·14	2·67	3·80	..	..	..	..	..
Maryborough—											
Tansey	5,198,071	537,057	216,763	10·33	2·48	4·17	273,454	..	243,996 89·23%	29,458 10·77%	..
Wondai	1,145,203	104,497	44,694	9·12	2·34	3·90	48·396	..	48,386 100·00%	..	..
Maxam, Cooranga North	6,683,158	742,168	272,439	10·84	2·66	4·08	687,176	..	631,829 89·33%	73,347 10·67%	..
Moola	5,446,624	554,491	197,748	10·18	2·80	3·63	271,922	..	210,673 77·48%	60·470 22·24%	779 0·28%
Mount Sibley	3,429,434	374,601	131,309	10·92	2·85	3·83	346,658	..	344,474 99·37%	2,184 0·63%	..
Mount Tyson	7,780,012	820,402	294,971	10·54	2·78	3·79	440,161	12,100 2·75%	390,651 88·75%	35,965 8·17%	1,445 0·33%

Pittsworth—											
Pittsworth	9,691,280	1,022,154	387,236	10·55	2·64	4·00	704,941	105,105 14·91%	575,454 81·63%	24,382 3·46%	.. ..
Brookstead	3,130,894	330,925	121,631	10·57	2·72	3·88	324,932	.. ..	232,790 71·64%	90,705 27·92%	1,437 0·44%
Linthorpe	4,975,044	515,295	193,861	10·23	2·63	3·90	398,259	.. ..	199,028 49·97	194,620 48·87%	4,611 1·16%
Scrubby Mountain . .	3,650,781	371,283	140,837	10·17	2·64	3·86	351,990	.. ..	83,691 23·78%	254,597 72·33%	13,720 3·89%
Springside	3,990,870	409,907	149,416	10·27	2·74	3·74	348,235	116,451 33·44%	230,821 66·28%	963 0·28%	.. ..
Yarranlea	5,730,306	584,432	216,404	10·20	2·70	3·70	317,547	588 0·19%	315,682 99·41%	.. ..	1,277 0·40%
Port Curtis—											
Bracewell	3,909,647	382,553	144,646	9·78	2·64	3·70	242,495	.. ..	197,430 81·42%	43,225 17·83%	1,840 0·75%
Theodore	2,694,703	282,599	104,084	10·49	2·72	3·86	..	..	..	..	..
Kraft, Quinalow	9,254,893	925,272	344,009	10·00	2·69	3·72	807,504	.. ..	619,546 76·72%	185,638 22·99%	2,320 0·29%
Ramsay	2,779,636	288,240	108,116	10·37	2·67	3·89	266,846	.. ..	215,886 80·90%	50·960 19·10	.. ..
Rockview	2,829,866	294,255	110,921	10·40	2·65	3·92	278,786	1,607 0·58%	257,850 92·49%	19,329 6·93%	.. ..
Rocky Creek	3,663,615	385,942	136,437	10·53	2·83	3·72	346,236	5,436 1·57%	283,422 81·86%	55,783 16·11%	1,595 0·46%
Rosemount	4,230,189	467,564	179,897	11·05	2·60	4·25	235,314	.. ..	154,781 65·78%	76,434 32·48%	4,099 1·74%
Southbrook	9,453,725	982,790	357,721	10·40	2·75	3·78	691,948	1,120 0·16%	641,974 92·78%	48,854 7·06%	.. ..
South Burnett—											
Goomeri	5,931,683	617,631	236,064	10·41	2·62	3·98	528,487	.. ..	382,368 72·35%	144,359 27·32%	1,760 0·33%
Murgon	6,290,484	623,213	238,503	9·91	2·61	3·79	317,773	.. ..	234,792 73·89%	82,981 26·11%	.. ..
Sugarloaf	2,082,833	243,673	94,401	11·70	2·58	4·53	153,780	.. ..	130,938 85·15%	22,514 14·64%	328 0·21%
Sunnyvale	2,765,688	281,907	108,063	10·19	2·61	3·91	174,680	.. ..	6,551 3·75%	147,483 84·43%	20,646 11·82%
Warwick—											
Greymare	2,817,204	277,640	118,208	9·86	2·35	4·20	124,497	.. ..	100,099 80·40%	24,398 19·60%	.. ..
Talgai	1,659,535	176,489	66,416	10·63	2·66	4·00	57,927	.. ..	8,309 14·34%	38,775 66·94%	10,843 18·72%
Victoria Hill	959,360	102,930	35,116	10·73	2·93	3·66	35,389	.. ..	1,919 5·42%	33,158 93·70%	312 0·88%
Mill Hill	25,360,397	2,323,540	865,608	9·16	2·68	3·41	637,939	.. ..	579,906 90·90%	58,033 9·10%	.. ..
Woodleigh	2,484,597	243,518	93,230	9·80	2·61	3·75	285,944	.. ..	92·745 32·43%	185,838 64·99%	7,361 2·58%
Yamsion	3,708,299	425,317	150,179	11·47	2·83	4·05	399,183	.. ..	209,218 52·41%	185,403 46·45%	4,562 1·14%
Yargullen	4,321,884	459,805	167,644	10·64	2·74	2·88	344,800	.. ..	305,222 88·52%	39,114 11·34%	464 0·14%
Queensland Agricultural High School and College, Lawes	16,216	1,755	693	10·82	2·53	4·27	..	..	..	..	..
Totals	**261,962,587**	**26,931,781**	**9,995,501**	**10·42**	**2·69**	**3·87**	**18,250,974**	**254,068 1·39%**	**12,605,192 69·07%**	**5,121,269 28·06%**	**270,445 1·48%**

BEEF AND DAIRY CATTLE CHAMPIONS.

R.N.A. SHOW, BRISBANE, 1946.

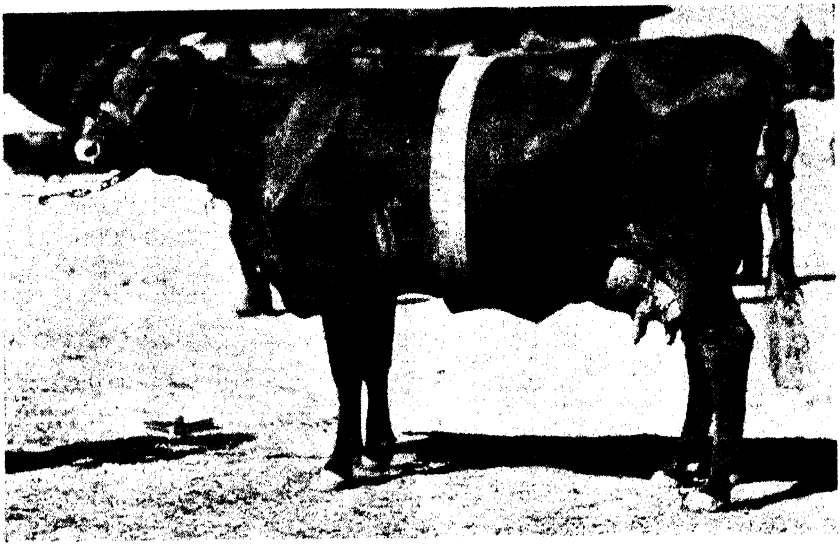


Plate 87.
Champion Butter-fat Cow.—"Fairvale Laurel II." Mr. W. C. Henschell.

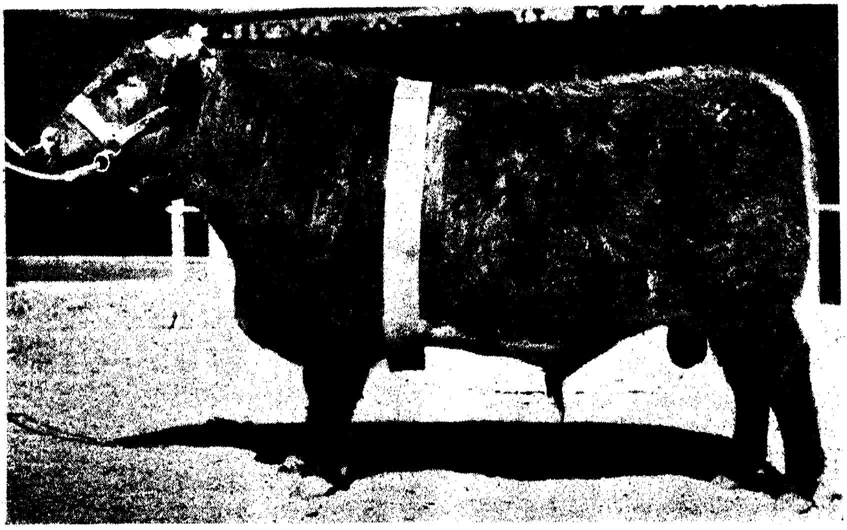


Plate 88.
Champion Beef Shorthorn Bull.—"Woomargama Jarnac." C. P. Fairbairn & Co.

Plate 89.
CHAMPION ABERDEEN ANGUS BULL.—"Booroomooka Ossian." Mr. H. G. Munro.

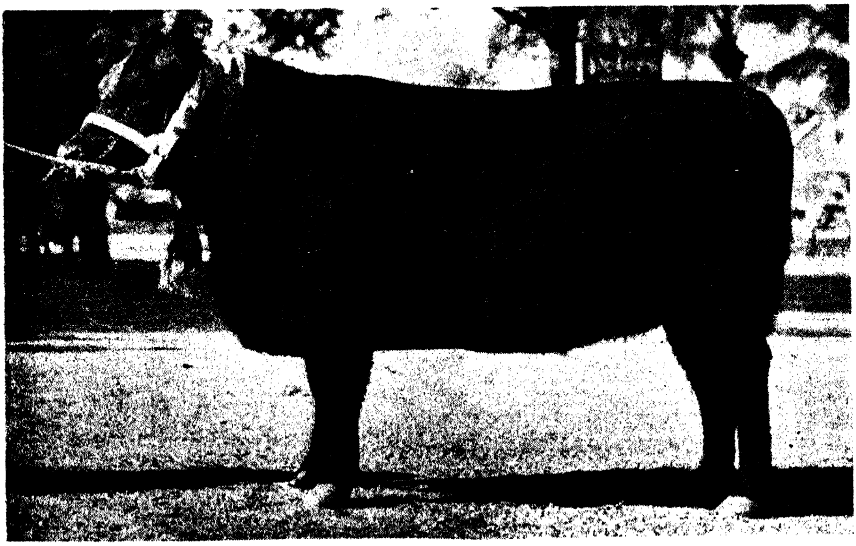


Plate 90.
CHAMPION ABERDEEN ANGUS COW.—"Booroomooka Noon." Mr. H. G. Munro.

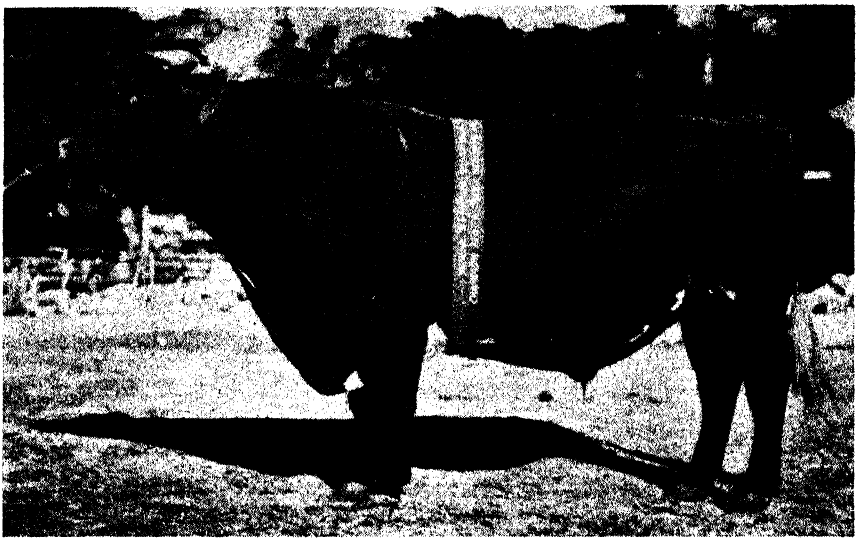


Plate 91.
Champion Australian Illawarra Shorthorn Bull.—"Sunny View Premium."
Mr. R. R. Radel.

Plate 92.
Champion Australian Illawarra Shorthorn Cow.—"Blacklands Miss Jean XVI."
Messrs. J. C. Meier & Sons.

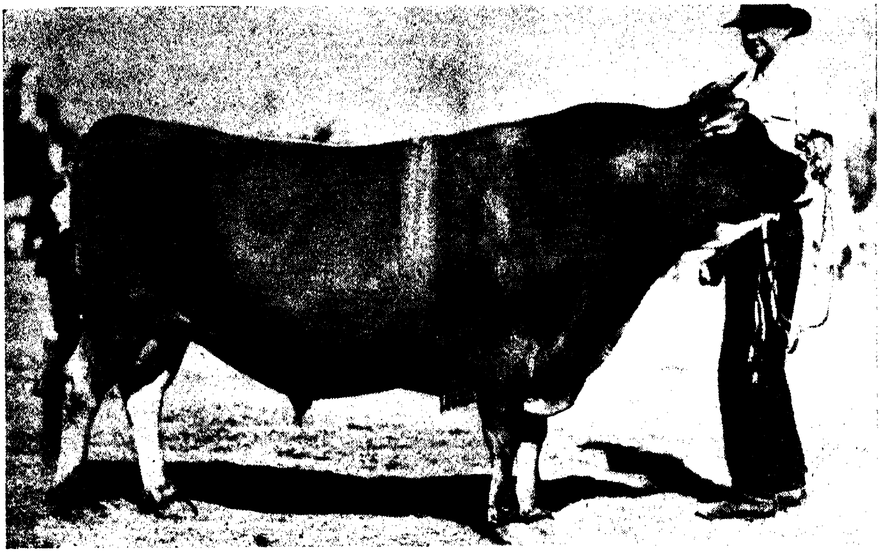


Plate 93.
CHAMPION JERSEY BULL.—"Navua Designing Star." Messrs. W. J. and M. Dunning.

Plate 94.
CHAMPION JERSEY COW.—"Oxford Carolyn." Messrs. E. Burton & Son.

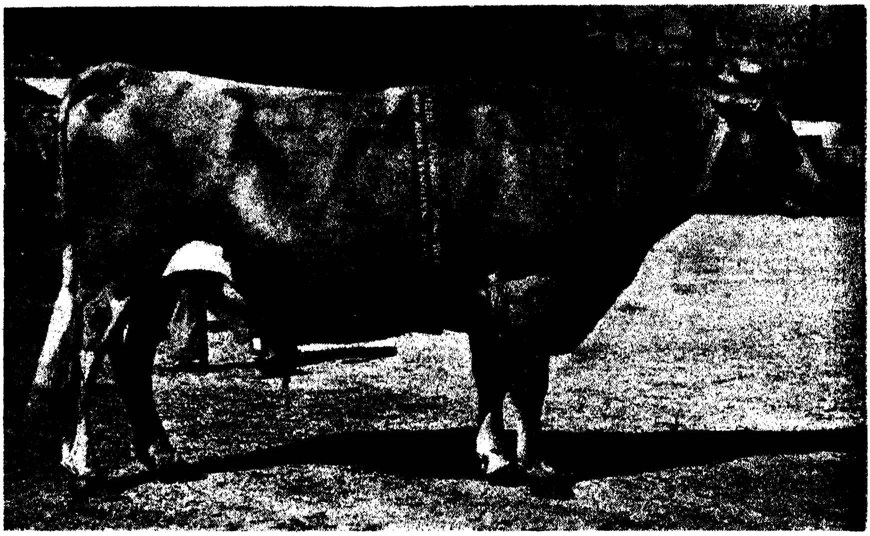


Plate 95.

Champion Guernsey Bull.—"Wollongbar Rosipheles Laddie." Mr. J. T. Collett.

Plate 96.

Champion Guernsey Cow.—"Laureldale Duchess." Mr. W. Cook.

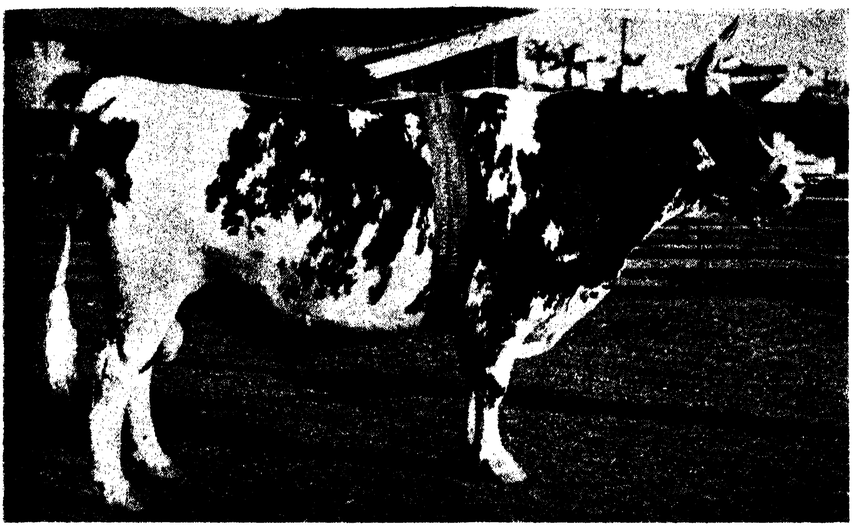


Plate 97.

CHAMPION AYRSHIRE BULL.—"Myola Perfection." Mr. J. P. Ruhle.

Plate 98.

CHAMPION AYRSHIRE COW.—"Myola Marion." Mr. J. P. Ruhle.

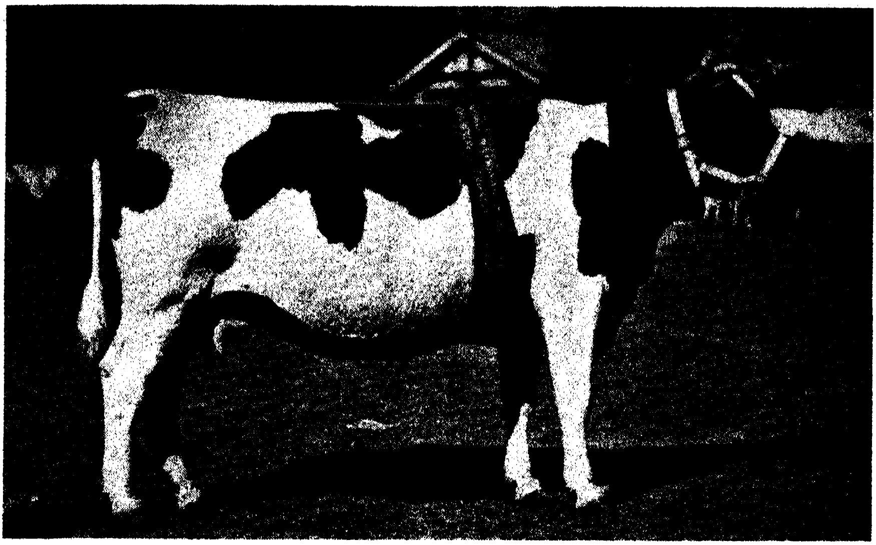


Plate 99.

CHAMPION FRIESIAN COW.—"Glendalough Clydella V." Hickey & Sons, Pty., Ltd.

◆

MILKING SHED HYGIENE.

It is a requirement under the Dairy Regulations for water and cloths to be used for the washing of udders and near parts of cows before commencing to milk. This, if done carefully, is a definite aid in reducing bacterial contamination from dust, hairs and manure particles which may fall into the milk bucket. It is, however, sometimes observed in the course of farm instructional visits that a tin of water is left standing after use in the bails to be used again during the next milking period. The soiled wash-cloths, too, are sometimes allowed to remain in the dirty water from one milking period to another. Such practices carry their own condemnation, for they not only nullify the advantage of washing udders, but add greatly to the bacterial contamination which their use, in the first place, was designed to avoid. So it would be better to neglect washing altogether than to use dirty water and dirty cloths.

After each milking period at least, clean cloths and water should be used. In fact the water should be changed as often as it becomes dirty during milking time. The cloths should be rinsed and wrung out, and changed, too, if they have become soiled; they should be boiled after each milking and hung to dry in a place protected from cowyard dust, yet in the sterilizing rays of the sun. A few Condy's crystals or a little of a chlorine compound added to udder wash waters would be an advantage.

—E. B. RICE.

Export Baconer Pigs.

BRISBANE ROYAL NATIONAL SHOW, 1946.

F. BOSTOCK, Officer in Charge, Pig Branch.

AFTER a lapse of four years, because of the war, the policy of offering inducement to pig raisers to produce a first class export baconer pig was again instituted by the Royal National Agricultural and Industrial Society of Queensland at its 1946 Exhibition, by providing a class for these pigs, conditions being similar to those of former years. Prize money of £40 was provided for this class, of which £25 was presented by the Department of Agriculture and Stock. An additional prize of a half-ton of Meggitts oil meal was presented by Messrs. Meggitts Ltd. for the exhibitor of the pen of pigs awarded the highest aggregate of points in the two judgings, i.e., alive and as carcasses.

Each entry consisted of three baconer pigs either pure bred or sired by a pure bred boar, and each pig between 180 and 200 lb. live weight. Seven entries were submitted for judging alive at the Show Grounds on 10th August and the judge, Mr. C. Shelton, used a score card which provided 45 points for condition, 45 points for uniformity of type and 10 points for general appearance.

The pigs were slaughtered at the Brisbane Abattoir on 12th August and after being chilled were judged by the writer, judging being based on the system of carcass judging evolved in England.

A feature of the competition was that the live judging corresponded closely to the carcass awards in respect to the first three placings—first in the live judging was also first in carcass award; second and third places when judged alive were third and second when judged as carcasses, but only half a point separated these entries.

The pigs when judged alive were of particularly good quality, no pen scoring below 90 points, while only two points separated the first and third pen.

In the carcass appraisal, eye muscle development was good in the majority of cases and averaged 59 per cent., while the first prize exhibit scored 89 per cent. There were no obviously overfat pigs, the average score being 83 per cent., with the lowest 70 per cent. and the highest 100 per cent. Body length was very fair, but improvement in this point is indicated as desirable; the average was 57, with a top score of 70 per cent. Leg length also needs attention. One pig did not score and one obtained only 20 per cent. in this section, both being too long in the leg, indicating excessive bone throughout the body. However, one exhibit scored 100 per cent., while the average was 60 per cent.

The marks awarded in each section both in live and in carcass appraisal are given in detail in the accompanying table, thus affording a good means of comparison of each feature.

Illustrations of one side with the section of the opposite side at the last rib afford another means of comparison and provide information of value to interested farmers.

DETAILED RESULTS OF "SPECIAL EXPORT BACONER PIGS" COMPETITION, ROYAL NATIONAL SHOW, 1946.

MIDDLE WEIGHT PIG APPRAISAL AT THE BRISBANE ABATTOIR.

Weight Range 180–220 Lb.	Points for Live Pig.							Carcass Appraisal.*														
No. of Entry.	Live Weight.	Dressed Weight.	Per cent Loss in Dressing.	Condition.	Uniformity and Type.	General Appearance.	Total.	Skin.	Fat.	Hams.	Shoulders.	Streak.	Total.	Eye Muscle.	Back Fat.	Body Length.	Leg Length.	Total.	Total Appraisal Points.	Grand Total.	Award Aggregate.
..	..	..	..	45	45	10	100	5	10	8	7	12	42	28	20	20	5	73	115	215	..
409 6	220 ..	.. 179	80·1 ..	44 ..	44 ..	9 ..	97 ..	5 ..	9 ..	7½ ..	6½ ..	9 ..	37 ..	52 mm. 25	28 mm. 14	840 mm. 13	585 mm. 5	57	94	191	First
405A 7	202 ..	.. 156	77·2 ..	44 ..	43 ..	8 ..	95 ..	5 ..	9½ ..	7 ..	6½ ..	10 ..	38 ..	45 mm. 19	19 mm. 18	800 mm. 13	575 mm. 4	54	92	187	Second
406 2	201 ..	.. 158	78·6 ..	44 ..	44 ..	8 ..	96 ..	5 ..	10 ..	7 ..	6½ ..	9 ..	37½ ..	43 mm. 17	21 mm. 20	795 mm. 12	580 mm. 4	53	90½	186½	Third
407 3	222 ..	.. 155	69·8 ..	42 ..	41 ..	7 ..	90 ..	5 ..	9½ ..	7½ ..	6½ ..	9 ..	37½ ..	46 mm. 20	23 mm. 18	805 mm. 14	620 mm. ..	52	89½	179½	Fourth (Head off)
411 0	199 ..	.. 156	78·4 ..	42 ..	41 ..	7 ..	90 ..	5 ..	9½ ..	7½ ..	7 ..	8½ ..	37½ ..	40 mm. 14	22 mm. 19	800 mm. 13	580 mm. 4	50	87½	177½	Fifth
408 4	198 ..	.. 148	74·7 ..	42 ..	42 ..	8 ..	92 ..	5 ..	9½ ..	7 ..	7 ..	9 ..	37½ ..	39 mm. 13	25 mm. 14	780 mm. 13	595 mm. 1	41	78½	170½	Sixth
414 8	204 ..	.. 157	77·0 ..	43 ..	41 ..	7 ..	91 ..	5 ..	9¾ ..	6½ ..	7 ..	9 ..	37¼ ..	37 mm. 9	26 mm. 14	765 mm. 6	590 mm. 3	32	69¼	160¼	Seventh

* Measurements are given in millimetres. 1 inch = 25 millimetres.

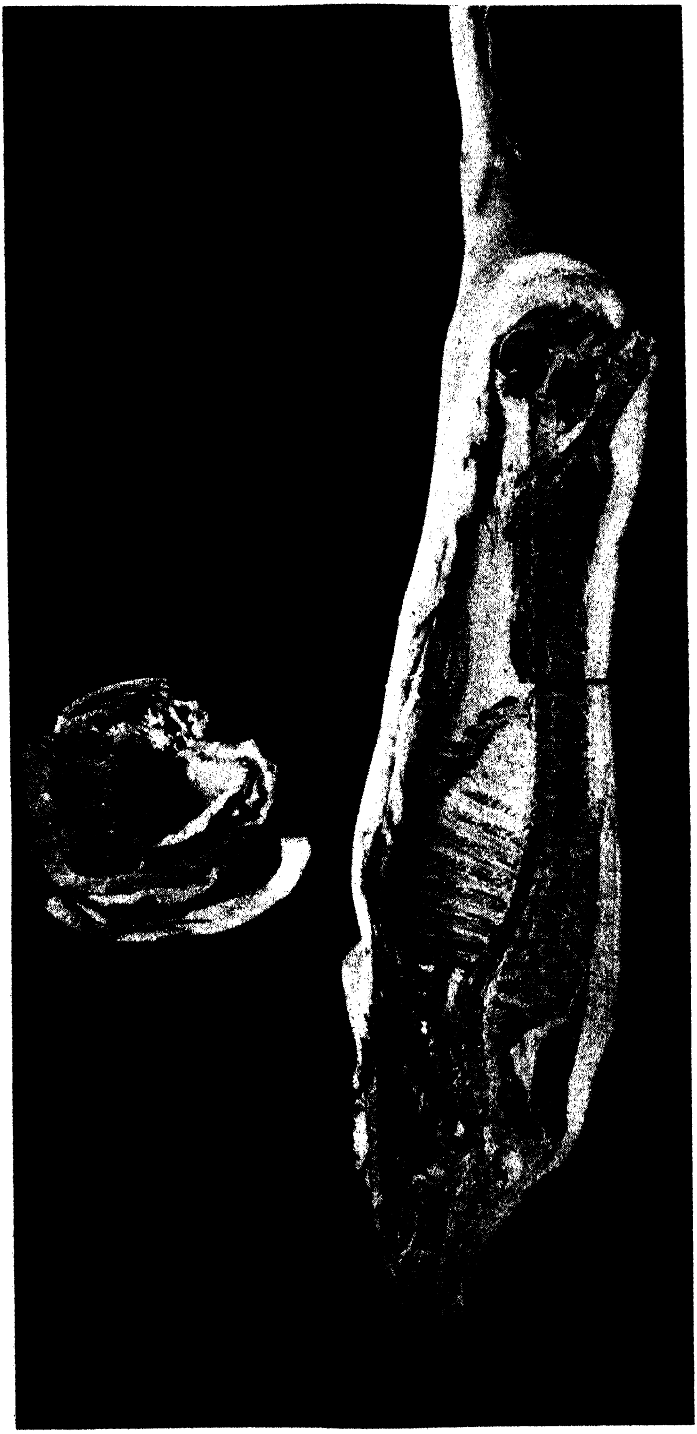


Plate 100.

First Prize.—Large White × Berkshire.

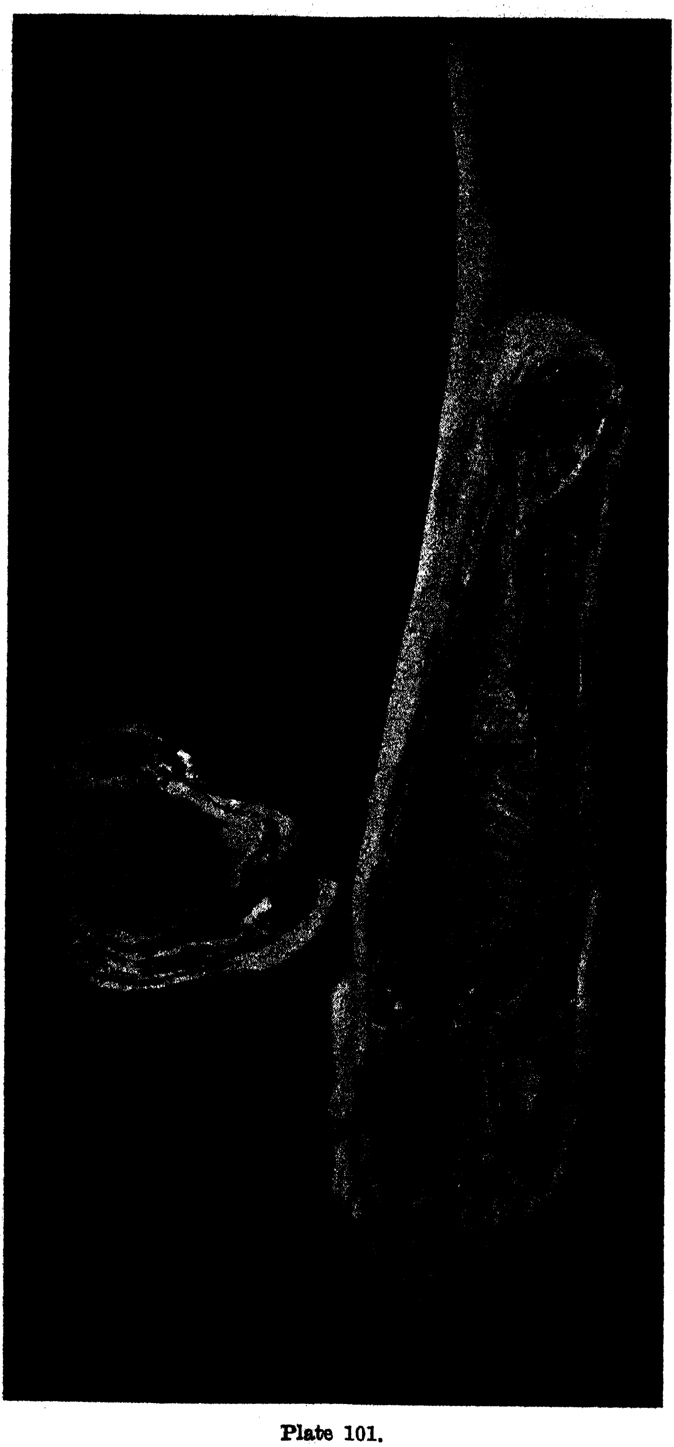


Plate 101.

Second Prize.—Large White × Berkshire.

Plate 102.

Third Prize.—Large White × Large White.

MARKETING

Co-operative Marketing in Queensland.

H. S. HUNTER, Director of Marketing.*

SINCE the Co-operative principle was initiated in England by the Rochdale pioneers just over a hundred years ago, the tremendous and romantic growth of co-operation throughout the world has been associated for the most part with consumers' buying co-operatives and manufacturing co-operatives. Co-operatives have rendered good service to producers in providing them with the facilities essential for production, including finance; and variants of the principle have been adopted with great success in providing co-operative or mutual assurance and insurance. But co-incident with successful development in these various fields of activity, there have been but partial successes and many failures in co-operative projects established for the selling of commodities. Failures of co-operative selling or marketing organisations have been most numerous where there have been many producers and therefore many sellers of the commodity concerned, such as in agriculture. The prime reason for the failure, or at best the partial success, of a producers' selling co-operative is that a very small proportion of the commodity concerned sold independently of the co-operative's operations is capable of affecting the whole market for that commodity and of depressing its market price to a degree, through competitive selling, which would place the co-operative always in a disadvantageous position. Except where the commodity concerned is in chronic short supply, or where the co-operative has a monopolistic control of some essential marketing facility such as storage, transport or processing, the co-operative, unless it defeats its own objective by competitive price cutting, is left with its goods still on its hands while the independent seller reaps the advantage of market stability to the cost of which he has not contributed. The buying co-operative and the manufacturing co-operative are not confronted with this disability merely because they do not command the whole field of their particular activity.

A means was provided by the Queensland Government after the world war of 1914-18 to make selling co-operatives for agricultural products operate effectively. This paper, under the title of "Co-operative Marketing in Queensland," will deal in a brief way with developments in this State with the co-operative, or as it is better known and perhaps more accurately described, the organised marketing of agricultural products.

What has become known as the "Queensland plan" for the marketing of agricultural products represented a revolutionary departure from orthodox agricultural co-operation in that a principle was introduced by means of which the producers comprising a small dissenting minority were compelled to conform to the decision of the industry as represented by the votes of a majority of not fewer than 66⅔ per cent. of the voters. In later years, this was reduced to a 60 per cent. affirmative vote, but, to guard against the possibility that through apathy on the part of growers a marketing scheme may come into being with the support of only a minority, it was provided additionally that at least 50 per cent. of those entitled to vote would have to exercise that privilege before the decision would be accepted as an affirmative decision.

---

* A paper read at the annual conference of the Co-operative Union of Queensland, Brisbane, 8th August, 1946.

It is to be noted that this element of compulsion is applicable for the specified duration of the scheme to all in the industry, i.e., to the voters who comprised the affirmative majority as well as to the negative minority. Primary producers' voluntary selling co-operatives, especially those which adopt the pooling principles, have failed as much from defections from their own ranks as from the operations of producers who have never been members of them.

State Pools.

Where a voluntary selling co-operative has to rely on seasonal contracts with its members, it is placed in an extremely precarious position. After the First World War, during which wheat was sold through the medium of State pools, the pools were continued as voluntary organisations in certain of the Australian States. Only in Western Australia was any success achieved. It was during that war that wheat growing first became an agricultural industry of prime importance in Western Australia, and consequently the post-war voluntary pool did not have to contend with competition from established wheat selling organisations and customs to the same degree as in the other wheat exporting States of the Commonwealth. In fact, the co-operative which managed the Western Australian pool was the sole agent for the receipt and handling of wheat during the four years of war. Furthermore, active local co-operative committees in the wheat growing areas have done much to ensure the pool's measure of success. Nevertheless, the percentage of the total marketable wheat received by the Western Australian voluntary pool gradually declined from 96 per cent. in the 1921-22 season to 28 per cent. in 1938-39.

In New South Wales the pool received 58 per cent. of the marketable wheat in 1921-22, but by 1927-28 its share of the crop had fallen to 5 per cent., and in the two succeeding seasons no pool was conducted. There was a partial recovery in 1930-31 when, with wheat a drug on the market, the pool handled 26 per cent. of the grain. The improvement was not maintained, for by 1933-34 the pool's proportion had again fallen to less than ½ per cent.

The Victorian and South Australian voluntary wheat pools were able to show better records than New South Wales, but the percentages in different seasons fluctuated widely. For example, the Victorian pool's percentages included, 78, 60, 34, 50, 12, 55, 15, 3 and the South Australian pool received wheat representing percentages in different seasons of 36, 44, 12½, 30, 60, 18.3, 1½. In these two States the voluntary wheat pools, after some seasons of experience, were forced to adopt a system whereby a minimum percentage of the total crop in the State had to be contracted in advance to the pool or it did not operate.

Queensland, by contrast, enacted *The Wheat Pool Act of* 1920, whereby the State Wheat Board was constituted and a compulsory pool was established to take the place of the wartime wheat marketing system. That pool operated with great success and continued during the years between the two world wars. The principles contained in *The Wheat Pool Acts* were in 1923 enacted in another measure, *The Primary Products Pools Acts,* an enabling Act which provided the necessary machinery which growers of certain primary commodities could, by their own initiative and with the consent of the prescribed percentage of their fellow growers, use for the orderly marketing of their particular commodity.

This Act has since been brought up to date and merged into *The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1941. They have been availed of by a wide range of primary producers and marketing schemes have been inaugurated and boards established for the State's production of arrowroot, barley, broom millet, butter, cheese, cotton, honey, peanuts, canary seed and ginger, while regional boards have been set up for the marketing of maize and pigs in North Queensland; eggs in South Queensland; and plywood in North and South Queensland. Fruit and vegetables have been organised under *The Fruit Marketing Organisation Acts,* 1923 *to* 1945. These commodities are not pooled, as is the case with commodities subject to the operations of *The Primary Producers' Organisation and Marketing Acts* and *The Wheat Pool Acts.* The activities of the fruit and vegetable industry's executive body, the Committee of Direction of Fruit Marketing and its six Sectional Group Committees, are for the greater part of a voluntary nature. The C.O.D. (as it is commonly called) is clothed with statutory authority and the element of compulsion comes into operation only when, with the consent of a three-fifths majority of the growers concerned, a "direction" is issued in respect to the manner in which any particular kind of fruit or vegetable may be marketed.

Of all of the marketing schemes which have been inaugurated under the various Queensland marketing Acts, none has been voted out of existence by the growers at any of the periods when the question of the continuance of a scheme has been placed before them. The operations of the Canary Seed Board, which was inaugurated in January, 1925, came to an end because of the lack of grower support and was allowed to expire by effluxion of time on 30th June, 1943. All other schemes are still in operation.

Boards have Obligations.

While the marketing legislation confers powers upon marketing boards, they also impose upon them certain responsibilities and obligations. For example, a marketing board is obliged to accept from any growers any of the commodity of merchantable quality delivered to the board by the grower. The board is charged with the responsibility of selling that commodity on behalf of the owner, i.e., the grower, and of returning to the grower his proportionate share of the net proceeds of sales. All growers of the commodity concerned are obliged to deliver to the board all of the commodity grown by them (excepting such small quantities as may be required on the farm for seed and feed). Marketing boards are charged with the responsibility of, as far as practicable, providing the commodity for consumption in Queensland and for its supply during any period of shortage to those places within

Queensland wherein a shortage is experienced. They may make such arrangements as they deem necessary with regard to sales of the commodity for export or for consignment to other States. A marketing board is required to receive and consider any petition signed by not fewer than one hundred consumers of the commodity in respect of which it has been established. To fulfil their functions marketing boards have been given certain powers including the power to enforce delivery by the grower to the board of his commodity and to levy a charge upon that commodity to meet the board's administrative expenses including marketing costs.

Boards may purchase, hold and dispose of land and buildings. They may appoint and employ officers and servants; appoint and employ agents, and arrange for financial accommodation with banks or the Government. Marketing boards may sue and be sued in their official names. They may study markets and disseminate correct marketing information, and generally do all such things necessary to effect a sale of the commodity. Marketing boards are not authorized to utilize the commodity and engage in processing or manufacturing or in other way risk the growers' money—the proceeds of sales—except where processing may be essential to selling as with the Cotton Board's ginning of seed cotton and the subsequent extraction of by-products from the cotton seed.

Marketing boards may adopt different methods to effect the organized marketing of the commodity with which they are concerned. For example, some boards ake physical possession of the commodity and employ the necessary staff to receive, store and distribute it to the market in an orderly manner over the full cycle of the season until a new crop is available, thus levelling out flucuating price extremes to the advantage both of the producer and of the consumer. Other boards employ agents, usually established and experienced commercial houses, to do this on the board's behalf. In still other cases where the nature of the commodity indicates it, as with butter and cheese, the boards achieve the necessary market stability by acting merely as licensing and price regulating authorities.

Boards do not Represent the Crown

It is evident that many of these powers could be exercised only with the authority of Government, and such Government authority has been delegated by Parliament, by means of the marketing Acts, to the boards established under them. Responsibility to the people for the manner in which these delegated powers are used, however, is still a responsibility of the Government and therefore provision has been made in the Acts for the appointment to every board set up under them of a Government representative in the person of the Director of Marketing or his deputy. Thus the interests of the consumer are safeguarded. The Queensland Government, it might be recalled, retained its power between the two world wars to fix maximum prices by the machinery provided in *The Profiteering Prevention Act of* 1920. It should be added that there is no instance on record in the quarter of a century of experience since the marketing schemes were first inaugurated where a marketing board has had to be arbitrarily restrained in the matter of prices. Under Australian conditions, at all events, the measure of collective bargaining, which has been placed in the hands of the producers by the schemes set up under the marketing Acts, has merely tended to place the producers as sellers on somewhat equal terms with the buyers.

In the rare instances where boards have withheld the commodity from the market in an effort to obtain a higher price their own growers have suffered loss. Experience has shown also that contrary to fairly widely held belief, marketing boards, selling as they do to the wholesale trade, can exercise very little, if any, influence over retail prices; as in the absence of arbitrary and effective price control measures to limit retail selling margins, the natural economic law of supply and demand will determine retail prices, notwithstanding that a marketing board may reduce its selling price to wholesale distributors.

The Director of Marketing and, in his absence, his deputy may exercise a vote on such questions as are decided by a marketing board. He, as an appointed member, has the same status on the board as a member elected by the growers, with the additional power that he may, at his discretion, refrain from voting on any question. The Government thus retains the right to exercise one vote on every marketing board, but otherwise the boards are entirely producer-controlled. The growers through their elected representatives determine their own selling policy. Marketing boards established under Queensland marketing laws do not represent the Crown for any purpose whatsoever.

The Queensland Plan.

The Queensland plan of organised marketing of agricultural products is a compound of the co-operative principles of Robert Owen and Horace Plunkett; the American populists' scheme of the 1890's by which farmers were advanced 80 per cent. of the market value of their produce delivered for storage in central warehouses pending sale; and Queensland's particular contribution of an enforced adherence to a scheme of marketing by all producers of a given commodity when the adoption of such a scheme has been decided upon by a 60 per cent. majority of the producers.

Many countries where this principle has since been adopted in agricultural marketing schemes have given credit to Queensland for having given something new to the world, as South Australia once gave to the world the Torrens system of land titles and land conveyancing.

This new conception of organised marketing for agricultural products was not introduced with universal acclaim, but far from it. In addition to the natural opposition from proprietary interests about to be displaced, there also was a certain amount of opposition to the principle, of critical comment concerning it, from orthodox agricultural co-operative circles, particularly those in the United Kingdom. The orthodox, or voluntary, co-operator saw in the new concept a danger that a tendency may develop for reliance to be placed more and more upon the assistance of Government, to the neglect of the voluntary co-operator's ideal of self-help, and so result in a weakening of the fibre and spirit of true co-operation. The danger was seen also that the Queensland plan may eventually prove to be but a first step towards governmental control of marketing. Actually it may have been an alternative to it. The early critics in the United Kingdom may not have realized the urgent necessity which existed, particularly in countries exporting agricultural products, for the co-operative principle to work effectively in agricultural marketing. Even at that early date the extent to which agriculture had fallen out of adjustment with the general economy of the country was being acutely felt in those countries which were predominantly producers of primary products. In countries with a protected economy, such as Australia, there was vital need to protect the level of domestic prices of agricultural products from the influence of what was happening overseas. The existence of the marketing schemes provided a foundation which enabled the producers themselves to so arrange that fluctuating overseas values and the costs of transport from Australia to overseas markets would effect only the produce to which such things had any true relation, i.e., the exportable surplus. In New Zealand, as the years went by, the same result was obtained for the dairying industry by the Government taking up all exportable surpluses of butter and cheese.

Voluntary and Compulsory Co-operation.

As the need for a correction of the lack of balance between the price levels for agricultural products and for other goods and services became more apparent, so the attitude of orthodox co-operators towards organized marketing with statutory powers yielded to modification.

The Year Book of Agricultural Co-operation had shown how an investigator, who had been deputed by the Horace Plunkett Foundation to examine and report on the development of agricultural co-operation throughout the British Empire in 1927-28, had had his co-operator conscience shocked by what he had found in Queensland. In later years, when there was a more universal acceptance of the inclusion of the principle of compulsion in co-operative marketing schemes to make them work effectively, the Horace Plunkett Foundation acknowledged that the marketing schemes are operated on the same principle of majority rule as that on which all of our democratic institutions and Parliament itself are based. The following is a quotation from the book *Co-operation and the New Agricultural Policy* published by the Horace Plunkett Foundation in 1935:—

> "The marketing schemes have one strong claim on co-operative sympathy. They are democratic. This has been called in question on two grounds, the compulsory element and the absence of real control by members. There is little in either objection, seeing that compulsory citizenship is the almost unnoticed essential of political democracy, and that pattern of industrial democracy, the consumers' co-operative movement, has admittedly a very small active electorate."

Meanwhile, following upon the economic blast which struck all countries, and particularly their agricultural industries, with the onset of the great depression in the early thirties, the Queensland type of organised marketing or some variant of it, was adopted in many countries throughout the world. New South Wales and Victoria had already passed marketing Acts on the Queensland model. The British Parliament passed its first *Agricultural Marketing Act* in 1931 and marketing boards were set up for a number of commodities. This principle of compulsory co-operation was introduced into grower-controlled agricultural marketing schemes in South Africa and in parts of Canada. It influenced the New Deal legislation of the United States, and it was adopted, or adapted, in some degree in countries of Europe and of South America.

In Australia, marketing boards of the type here referred to have proved on the whole to be most successful, notwithstanding that their operations have been hampered by their inability to exercise control over interstate trade, because of the provision in Section 92 of the Commonwealth of Australia Constitution that "Trade and commerce and intercourse between the States shall be absolutely free." This constitutional provision in its application to the marketing of agricultural products has caused much litigation, including the Peanut case and the James case, the latter being concluded in the Privy Council.

The type of grower-controlled collective marketing board which we have been discussing is often confused with war-time boards which were set up by the Commonwealth Government under the authority of *The National Security Act.*. The latter boards were administered by appointees of the Government and very frequently all they could do was to make the best of a bad situation, as, for example, when the season's market for Australian apples was reduced overnight from 12,000,000 bushels to 6,000,000 bushels. These emergency boards could not do a normal job of marketing, but could only do what was possible to ease the blow to the industry caused by the dislocations of war. However, they also were known as marketing boards, and consequently there has been an unfortunate tendency in the public mind to associate all marketing boards with disorganised conditions.

Marketing Boards Need Co-operative Spirit.

The future of grower-controlled statutory marketing boards will depend to some extent on the wisdom with which they are administered. Not only must they establish the right to exist by being more efficient than other marketing systems, but they must retain and inculcate through the ranks of their growers the spirit of co-operation. Their delegated governmental powers must be used with a due sense of responsibility and those who direct their activities must resist any tendency for the boards to degenerate from the business directorates, which they should be, to mere pressure groups. Efficiency of management is an essential, but dictatorship in management a danger, particularly in view of the boards' extensive statutory powers. The use of such powers should be subject to the democratic checks of an effective board of directors in full control of policy.

A discussion group on the sale of agricultural requirements, appointed by the Imperial Conference on Agricultural Co-operation held at Glasgow in July, 1938, reported as follows:—

> "In ordinary business it is not easy to get qualified managers, but for a farmers' society it is twice as difficult, as the man must not only have a good commercial training and market experience, but he must also have faith in the co-operative ideal."

The discussion group suggesed that:

> "A register should be compiled and kept at some central 'clearing house,' so that when young people are introduced into the co-operative movement and trained up their names could be entered, and when societies required managers or additions to their staff they would thus be able to obtain suitable people from the register. Actually this would mean that the larger societies—with greater financial reserves—would be training managers for the smaller ones."

There may be food for thought in this suggestion for both voluntary and compulsory co-operatives in Queensland.

At the Glasgow conference referred to, one great co-operative champion, Professor A. W. Ashby of the University of Wales, crystallized his attitude towards the introduction of the element of complusion into selling co-operatives, i.e., the United Kingdom agricultural marketing board, as follows:—

> "The bedrock of co-operation is the element of voluntary association in mutual protection and endeavour and without it no co-operative system can function effectively or for very long. But it must be effective, and in most cases it is not effective without the aid of philanthropists or the State."

We should be able, by education, to clothe the structure of agricultural marketing, which we have built up in Queensland through grower-controlled statutory marketing boards, with the spirit of co-operation as preached by the late Sir Horace Plunkett.

The formation of a Co-operative Union of Queensland and occasions such as that which we celebrate to-day should prove of great assistance in that task.

THE CARE OF EGGS ON THE FARM.

Eggs stored on the farm while awaiting despatch to market should be kept in a place free from mouldy or musty smells, which, while being sufficiently ventilated, should not be draughty. The temperature of the egg storage room also is important, for eggs should be kept as cool as practicable. Where a cool room is not available, the best thing to do is to pack the previous day's eggs early in the morning. Eggs should not be exposed too much to the air; they should be covered over after packing and pending transport. Exposure to air leads to rapid evaporation, resulting in eggs often being rejected as stale.

A LONG-TERM LIVESTOCK POLICY.

Most dairy farmers will agree that it is better to have a high-level "lifetime" yield per cow and regular breeding performance, than to have short-period or isolated spectacular yields. That suggests the need of a long-term livestock policy so as to establish confidence and provide the facilities for raising herd standards, individually and nationally. Good houses and other farm buildings, skilled labour, extension of veterinary services, electricity, adequate water supply, modern equipment and an improved herd recording system would be covered by a well-balanced, long-range policy for the farming industry, which would enable all concerned to have confidence in its future development.

BROOM MILLET SEED FOR SALE.

To growers desirous of obtaining a pure and reliable strain of White Italian Broom Millet seed, the Department is offering a limited supply of seed raised from a specially selected strain.

Applications for seed, with accompanying remittance, should be addressed to—

The Under Secretary,
Department of Agriculture and Stock,
BRISBANE.

Postal address and name of railway station should be given.

Price.—The seed is being retailed at **6d. per lb.**, freight paid to purchaser's nearest railway station. Each applicant is limited to 10 lb.

GENERAL NOTES

Staff Changes and Appointments.

Mr. Fielding Chippendale, M.Sc.Agr., Adviser in Agriculture, has been appointed Analyst, Agricultural Chemical Laboratory, Department of Agriculture and Stock.

Mr. N. A. H. Smith, B.Sc. (Melbourne), has been appointed Soils Survey Officer, Agricultural Chemical Laboratory.

Mr. C. R. Mulhearn, B.V.Sc., Divisional Veterinary Officer, at present stationed at the Animal Health Station, Oonoonba, will take up duty at Kingaroy, and Messrs. L. G. Newton, B.V.Sc., and O. H. Brooks, B.V.Sc., Veterinary Officers, will be transferred from Atherton to Oonoonba and from Oonoonba to Atherton, respectively.

Mr. K. W. Brown, B.V.Sc., Assistant Veterinary Officer has been transferred from Brisbane to Southport.

Testing of Stock for Disease.

Regulations have been approved under the *Diseases in Stock Acts* which provide for the control of the testing of stock for disease. The regulations provide that no person except a veterinary surgeon registered under *The Veterinary Surgeons Act* of 1936 or a person authorized in writing under the hand of the Chief Inspector of Stock shall subject any stock to a test involving the use of tuberculin, antigen or other biological product. Any person who has subjected stock to a test involving the use of these agents shall within two days furnish a detailed report in writing to the Chief Inspector of Stock, Brisbane, on the results of such test. No person may vaccinate cattle with living abortion bacilli unless a permit is granted by the Chief Inspector of Stock. Similarly, a report on such vaccination, giving the name of the vaccine used, must be furnished within two days.

Burdekin River Trust.

Mr. A. M. Taylor, Stipendiary Magistrate, who has been transferred from Ayr to Bundaberg, has tendered his resignation as Chairman of the Burdekin River Trust. Executive approval has been given for the appointment of Mr. J. C. Mathison, Northern Divisional Engineer, Main Roads Commission, who is also Chairman of the Herbert River Trust, to be Government Representative and Chairman of the Burdekin River Trust, as from 1st July, 1946. This appointment is made pursuant to the provisions of *The Burdekin River Trust Act* of 1940.

Banana Board Levy.

An Order in Council has been issued under *The Banana Industry Protection Acts*, 1929 *to* 1937, providing for a levy on banana growers, to be used for the maintenance of the Banana Industry Protection Board. The levy is at the rate of 1½d. per case containing one and a-half bushels or less on all bananas marketed in the case, and 2d. in the £1 sterling or part thereof on the proceeds of sales of all bananas marketed in the bunch. The present assessment, which operates annually, came into operation on the 26th August, 1946.

Trans-Border Stock Passings.

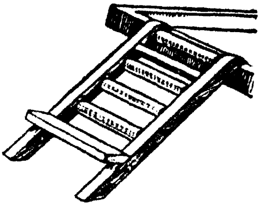
An Order in Council has been issued under the *Diseases in Stock Acts* appointing Beebo to be a crossing place for stock introduced into Queensland from New South Wales. In this connection, Mr. W. Mutch, New South Wales Assistant Inspector of Stock at Beebo, has been appointed also an inspector under the *Queensland Diseases in Stock Acts.*

GADGETS AND WRINKLES

LIFTING AND LOADING UNSEWN BAGS.

The following are some very practical suggestions. It is often necessary to load unsewn bags in transporting wheat to and from the paddocks and to lift bags of super into drills, etc., and the following home-made arrangements might prove useful to any who find this sort of work difficult; in fact, any one of them will minimise labour and thus help in the day's work.

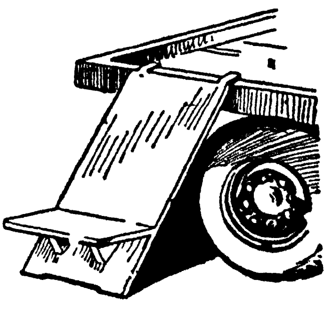
A ONE-MAN LOADER FOR TRUCKS.



This is a one-man loader. It consists of two pieces of timber, with about four rollers and a platform about 3 inches wide, one foot from the lower end.

It is placed against the side of the truck, and, by using two bag hooks, the bag of wheat can be lifted on to the platform. The extra foot from the ground brings the top of the bag about level with the truck body.

ANOTHER SIMPLE TRUCK LOADING HELP.

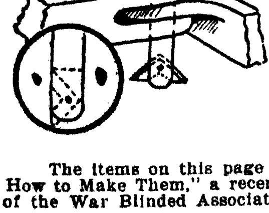


Procure a piece of board, about 1 inch thick, and 12 to 14 inches wide, and long enough to reach the level of the truck body when placed at about a 20 to 25 degrees angle. Plane the face of the board very smooth and on top of the board fix two small iron brackets made to go over the side rail of the truck, with a small flange bent over the top to grip the side.

At about 8 to 12 inches from the bottom of the board attach a shelf. With the aid of two bag hooks, any ordinary man will have no difficulty in placing a bag of wheat on this shelf; and, as the board is smooth, it is surprising how easy it is to pull the bag up it when standing on the truck.

By pulling up to a well-built dump where the bags are, say, three wide, the bags are then always near the boards. By moving the boards along the body of the truck, as required, loading can be done quickly.

A NOVEL TRAILER HITCH PIN.



A very useful trailer hitch pin may be made with a steel bolt and a triangle key, as shown here. The bolt is slotted, and the triangle key held in place by a pin.

The shape of the triangle key causes it to hang in a horizontal position, with the ends projecting from either side of the pin to stop the bolt from bouncing out of the hitch. This saves a lot of time hooking up and unhooking.

The items on this page have been extracted from "Handy Farm and Home Devices and How to Make Them," a recent notable work by J. V. Bartlett, published in Adelaide on behalf of the War Blinded Association. This useful book will soon be on sale in Queensland.

The FARM HOME

Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

THE BABY'S SLEEP IS IMPORTANT.

CONSIDERING that all mothers and fathers know the value of sleep for themselves—realizing how much better they feel after a night of quiet unbroken sleep—it is amazing how some will deprive their babies and toddlers of this great necessity without the slightest thought. It is commonplace nowadays to see fretful, tired children being taken home from picture shows and other entertainments, when they should have been peacefully asleep in their cots for several hours. Many young mothers have learnt the importance of feeding baby correctly, but not many realize that sufficient sleep and rest in a quiet airy room is very important also.

The small baby should be trained to sleep at the same time every day and all night. *During the first year of life baby's brain grows to be two and a-half times as large as it was at birth, and his body three times as large.* While he is growing so fast he must have plenty of sleep because sleep aids growth. A baby who sleeps peacefully is usually a healthy baby.

Amount of sleep required.

1. A healthy new-born baby should sleep nearly all of his time except when he is feeding or being bathed.

2. During the second and third months he should sleep from eighteen to twenty hours.

3. From the sixth to the twelfth month he should sleep twelve hours at night with a two-hour nap in the morning and afternoon.

4. In the second year of life a child should sleep twelve hours at night, with at least one hour nap during the day.

The baby's position in bed should be such that he has plenty of room to stretch. Gently changing a young baby from one side to another once or twice during a long sleep helps him to sleep longer and get more rest. As he gets older he will, of course, turn over himself. The room should be well ventilated and shaded—if the baby sleeps on the veranda the cot should be shaded from glare. Sleeping in a perambulator, or in his mother's arms in the close atmosphere of a picture show or public hall, is neither healthy nor restful, and no parent with the baby's welfare at heart would subject a helpless child to these conditions.

Causes of Sleeplessness.

1. Wrong food.
2. Too much or too little food.
3. Feeding irregularly or too often.
4. Wet or soiled napkins.
5. Baby too warm or not warm enough.
6. Uncomfortable position.
7. Not enough fresh air.
8. Uncomfortable bed or bedding.
9. Illness.
10. Too much excitement before bedtime.
11. Bad training, such as—
    (*a*) Petting baby whenever he wakes and cries;
    (*b*) Giving food to stop baby crying.

If the baby sleeps badly the sister at the Welfare Centre will help to find out the cause and suggest a remedy. Do not give soothing syrups or powders to make a baby sleep. If these are necessary in cases of illness, the doctor will order them.

Remember that if a baby is to be well and have a stable nervous system he must have all the sleep he needs, and to obtain this he must be wisely trained and go to bed in an atmosphere of peace and love and security.

Any further information may be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau, 184 St. Paul's terrace, Brisbane*, or by addressing letters *Baby Clinic, Brisbane*. These letters need not be stamped.

IN THE FARM KITCHEN.

Dishes for Dinner.

Lamb Terrapin.

Cut fat from left-over cold lamb and mince into dish. Measure 2 cups and put aside. Melt 2 level tablespoons butter or good dripping in saucepan, and 1 level tablespoon flour, 1 teaspoon dry mustard, a little salt and paprika. Cook a little, add 1 tablespoon Worcestershire sauce and 1½ cups stock or left-over gravy and cook 5 minutes. Add the diced meat and the sieved yolks of 2 hardboiled eggs; allow mixture to become piping hot, but do not boil. Lastly, add the chopped whites and serve on rounds of buttered toast. Sprinkle with finely chopped parsley mixed with a little shredded and fried bacon.

Baked Parsnips.

Scrape or pare parsnips discarding centre core if it seems dry and tough. Cut into pieces of suitable serving size. Cook in rapidly boiling salted water or meat stock until thoroughly tender. Drain. Lift pieces carefully and place in a flat baking-serving dish. Add bits of butter unless there was sufficient fat in the cooking liquid, and dashes of white pepper. Sprinkle buttered crumbs over and between the pieces and bake in hot oven for 15 minutes. Serve while hot.

Steak and Kidney Pie.

Required: 1 lb. shoulder steak, 2 sheep kidneys, 1 tablespoon of flour, 1 minced onion, salt and pepper, stock or water. Cut the steak and kidneys into very small pieces. Mix the flour and seasoning. Dip the meat in flour. Pack a pie-dish loosely to a little above the level. Fill with water and cover with flaky pastry. Make a small opening and bake in a hot oven.

Bacon Rolls.

These are especially good if served very hot. Prepare some pastry with ½ lb. self-raising flour, 2 lb. cooked and mashed potatoes, 4 oz. of dripping. Salt and pepper to season, add sufficient water to bind to a nice consistency. Flour a pastry board and roll the mixture out thin and smoothly. Cut the pastry into strips, and upon each strip place a slice of bacon from which the rind and edge have been cut. Roll up the pastry and bacon, put on a well-greased pan, and bake for half an hour.

QUEENSLAND WEATHER FOR SEPTEMBER.

During an unsettled period between the 17th and 20th of the month a very opportune rain distribution was received over the South-East Divisions of the State. Over-average district totals were recorded as follows:—296 points, South Coast, Moreton; 370 Darling Downs East; 266 Darling Downs West; 125 Maranoa and 101 Warrego. Many stations in the southern half of the Downs and the Moreton district registered good soaking falls of 3 to 5 inches, which should ensure, for the time being, welcome recovery in farming and dairying prospects from the rainless conditions since the beginning of April. Approximate district averages of 1 inch in the Warrego and Maranoa were slightly above the normally dry figures for September. The clearing variable storm distribution on the 20th in the Port Curtis and adjacent Central Highlands also aggregated approximately the same amount but 18 per cent. below normal. Benefit in these districts would be mainly in the form of tank water, &c. Any freshening growth of pastures and crops would need to be consolidated by a series of early October storms totalling some inches before the parched conditions resulting from the protracted dry spell are alleviated. Abnormally dry weather was still maintained in the Central and Tropical Coast Divisions where, apart from isolated coastal showers, nil reports were received from many places. Over the Tropical and Central Interior as well as the Lower West it has been rainless since February. Practically all pasture land needs not only early storm benefit but a favourable monsoonal summer soaking to regain normal carrying capacity. Some stock losses followed in the rain benefited areas through cold and bogging. In the wheat areas rain was too late for normal cultivation and commercial grain yields, though a small percentage of dry sown areas would benefit for other purposes.

Pressure.—During the greater part of the month the continental high pressure belt continued its fine weather control as the main centres passed from west to east across inland Australia. Towards the third week the centres moved further southward allowing a shallower isobaric dip control in northern Australia. This formation became more pronounced by the 17th when a closed centre formed at the foot of the dip in south-west Queensland and north-west New South Wales, with fairly stable supporting high pressure areas to the south and along the eastern coastline of the Continent. Slow general south-east movement of the unsettled area with the first useful north-east to northerly warm air stream brought the good rains in south-east Queensland and northern New South Wales till the 20th. Fine weather controls then prevailed as far as Queensland was concerned, but low pressure activity continued round the south-east of the Continent with a marked southerly front on the 22nd and 23rd, bringing cold air throughout Queensland. Moderate to rather rough weather was experienced on the Sub-tropical Coast 20th and 21st, with squally north to north-west winds and rain.

Temperatures.—Average maximum temperatures fairly normal, from 0.5 degrees below at Thargomindah to 1.8 degrees above at Boulia. A few daily recordings over 100 degrees in the West 16th/18th. Boulia, 102 degrees (17th). Average minimum temperatures were slightly above normal in the south-west quarter, but in other districts from 4.0 degrees below at Mitchell to 5.1 degrees at Stanthorpe and Palmerville. Cold night conditions were accompanied by frosts in the south-east quarter, Mitchell 17 nights (29 degrees screen 21 degrees grass, 18th) and Stanthorpe 19 nights (22 degrees/15 degrees, 1st).

Brisbane.—Pressure 30.084 inches (normal 30.050 inches). *Temperatures.*—Mean maximum 74.5 degrees (normal 75.5 degrees), mean minimum 53.7 degrees (normal 54.8 degrees); mean temperature 64.1 degrees (normal 65.2 degrees). Highest daily 85.7 degrees (14th), lowest 43.9 degrees (1st), lowest since 13th September, 1939, when 43.9 degrees. *Rain.*—367 points on four days (average 196 on eight days), highest since 394 points, September, 1943 (360 points fell on three consecutive days). *Sunshine.*—26.79 hours (average 2,474 hours). Maximum wind gust, 46 miles per hour westerly on 22nd.

The rain position is summarised below—

Division.	Normal Mean.	Mean Sept. 1946.	Departure from Normal.	Aggregate 5 mths. Totals May, June, July, Aug., and Sept.	Average May, June, July, August, and September.
	Points.	Points.	Per cent.	Points.	Points.
Peninsula North	13	Nil	100 below	183	270
Peninsula South	24	Nil	100 ,,	11	150
Lower Carpentaria	17	Nil	100 ,,	3	136
Upper Carpentaria	36	Nil	100 ,,	1	244
North Coast Barron	92	6	93 ,,	403	825
North Coast Herbert	155	12	92 ,,	318	1,220
Central Coast East	108	7	93 ,,	75	658
Central Coast West	70	5	93 ,,	18	396
Central Highlands	102	49	52 ,,	77	588
Central Lowlands	65	2	97 ,,	17	399
Upper Western	29	1	97 ,,	2	204
Lower Western	44	3	93 ,,	3	269
South Coast Port Curtis	141	116	18 ,,	219	891
South Coast Moreton	206	296	44 above	437	1,248
Darling Downs East	167	370	122 ,,	458	818
Darling Downs West	104	266	156 ,,	295	635
Maranoa	118	125	6 ,,	139	651
Warrego	88	101	15 ,,	114	516
Far South-west	56	19	66 below	38	372

Commonwealth of Australia, Meteorological Bureau, Brisbane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

SEPTEMBER RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of years' records.	Sept., 1945.	Sept., 1946.
North Coast.	In.		In.	In.
Atherton	0·74	42	0·45	Nil
Cairns	1·65	61	0·28	0·17
Cardwell	1·47	71	0·61	Nil
Cooktown	0·56	67	Nil	0·01
Herberton	0·55	57	0·49	Nil
Ingham	1·51	51	0·66	0·52
Innisfail	3·52	62	2·32	0·11
Mossman	1·93	19	0·46	0·24
Townsville	0·70	72	0·09	0·01
Central Coast.				
Ayr	1·21	56	0·21	Nil
Bowen	0·77	72	0·98	Nil
Charters Towers ..	0·75	61	Nil	0·10
Mackay	1·60	72	1·31	0·12
Proserpine	1·89	40	1·17	0·09
St. Lawrence ..	1·19	72	3·57	0·32
South Coast.				
Biggenden	1·38	44	3·15	1·13
Bundaberg	1·48	60	3·26	1·08
Brisbane Bureau ..	1·96	94	3·17	3·67
Caboolture	1·76	67	2·23	3·96
Childers	1·64	48	2·58	0·71
Crohamhurst.. ..	2·40	50	1·43	3·22
Esk	1·94	56	3·66	4·26

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of years' records.	Sept., 1945.	Sept., 1946.
South Coast—cont'd.	In.		In.	In.
Gatton College ..	1·43	44	1·90	5·20
Gayndah	1·47	72	3·08	2·23
Gympie	2·02	73	1·67	1·48
Kilkivan	1·61	62	1·31	0·96
Maryborough ..	1·84	72	3·14	0·76
Nambour	2·26	47	2·84	2·25
Nanango	1·71	61	1·81	2·19
Rockhampton ..	1·22	72	2·84	1·23
Woodford	2·04	55	2·05	3·06
Darling Downs.				
Dalby..	1·61	73	0·97	1·61
Emu Vale	1·66	47	0·92	3·85
Jimbour	1·52	64	1·72	1·64
Miles	1·26	58	1·39	1·72
Stanthorpe	2·19	70	1·78	4·48
Toowoomba	2·01	71	1·34	3·65
Warwick	1·75	78	0·93	4·49
Maranoa.				
Roma	1·32	69	0·07	0·84
St. George	1·03	62	0·35	2·29
Central Highlands.				
Clermont	0·95	72	0·27	0·01
Springsure	1·22	74	0·44	0·23

CLIMATOLOGICAL TABLE FOR SEPTEMBER.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	82	64	86	21, 23 26	58	30	17	3
Herberton	..	77	52	86	22, 23	44	30	Nil	..
Townsville	..	81	62	91	21	55	7, 10, 2	1	1
Rockhampton	30·10	82	54	91	14	42	1	123	1
Brisbane	..	75	54	86	14	44	1	367	4
Darling Downs.									
Dalby	..	76	46	92	14	32	1	161	3
Stanthorpe	..	68	36	83	13	22	1	448	6
Toowoomba	..	71	44	86	14	33	1	365	5
Mid-Interior.									
Georgetown	30·02	91	59	99	15, 16	51	13	Nil	..
Longreach	30·12	87	55	100	16	44	8	Nil	..
Mitchell	30·12	79	41	91	13	29	8	31	2
Western.									
Burketown	..	88	61	95	30	56	11, 27	Nil	..
Boulia	30·03	88	56	102	17	45	9	Nil	..
Thargomindah	30·10	78	52	100	17	41	8	15	2

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

NOVEMBER.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	4.59	6.05	Cairns	46	11	Longreach	42	28
6	4.55	6.09	Charleville.. ..	29	25	Quilpie	33	37
11	4.52	6.12	Cloncurry	61	38	Rockhampton ..	17	3
16	4.50	6.16	Cunnamulla ..	28	31	Roma	18	15
21	4.48	6.20	Dirranbandi ..	17	21	Townsville.. ..	37	12
26	4.47	6.24	Emerald	26	13	Winton	49	31
30	4.46	6.27	Hughenden ..	46	24	Warwick	3	6

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	a.m.	a.m.
1	10.04	..
2	10.59	12.19
3	11.56	1.02
	p.m	
4	12.55	1.41
5	1.54	2.17
6	2.54	2.52
7	3.57	2.27
8	5.02	4.03
9	6.10	4.42
10	7.20	5.25
11	8.31	6.14
12	9.39	7.09
13	10.42	8.09
14	11.37	9.14
15	..	10.20
	a.m.	
16	12.25	11.24
		p.m.
17	1.06	12.25
18	1.42	1.23
19	2.14	2.19
20	2.46	3.14
21	3.16	4.08
22	3.48	5.02
23	4.20	5.56
24	4.56	6.51
25	5.35	7.46
26	6.19	8.39
27	7.06	9.29
28	7.57	10.16
29	8.51	10.59
30	9.46	11.39

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville	27;	Cunnamulla	29;	Dirranbandi	19:
Quilpie	35;	Roma	17;	Warwick	4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	29	11	45	25	20	0	52	28
6	20	16	37	32	11	8	42	36
11	11	28	26	43	1	19	29	51
16	13	26	29	42	3	17	32	49
21	21	15	38	31	12	7	43	35
26	29	10	45	25	20	0	52	28
30	27	12	43	27	18	2	51	30

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	53	5	67	34	50	20	44	7
3	47	8	62	36	47	22	38	9
5	38	17	56	43	41	27	32	17
7	27	28	49	49	33	34	23	24
9	14	40	41	57	26	42	14	34
11	7	49	36	63	21	49	8	41
13	5	53	35	66	20	51	6	44
15	10	49	38	63	23	49	10	41
17	14	41	41	58	26	43	14	34
19	24	31	47	51	32	36	21	26
21	34	20	54	44	38	29	29	18
23	44	11	60	38	45	24	36	12
25	51	5	65	34	49	20	42	7
27	54	4	67	34	51	20	44	6
30	49	10	63	38	48	23	40	11

Phases of the Moon.—First Quarter, November 2nd, 2.40 p.m.; Full Moon, November 9th, 5.10 p.m.; Last Quarter, November 16th, 8.35 a.m.: New Moon, November 24th, 3.24 a.m.

On November 15th the sun will rise and set 20 degrees south of due east and true west respectively, and on November 7th and 20th the moon will rise and set approximately true east and true west respectively.

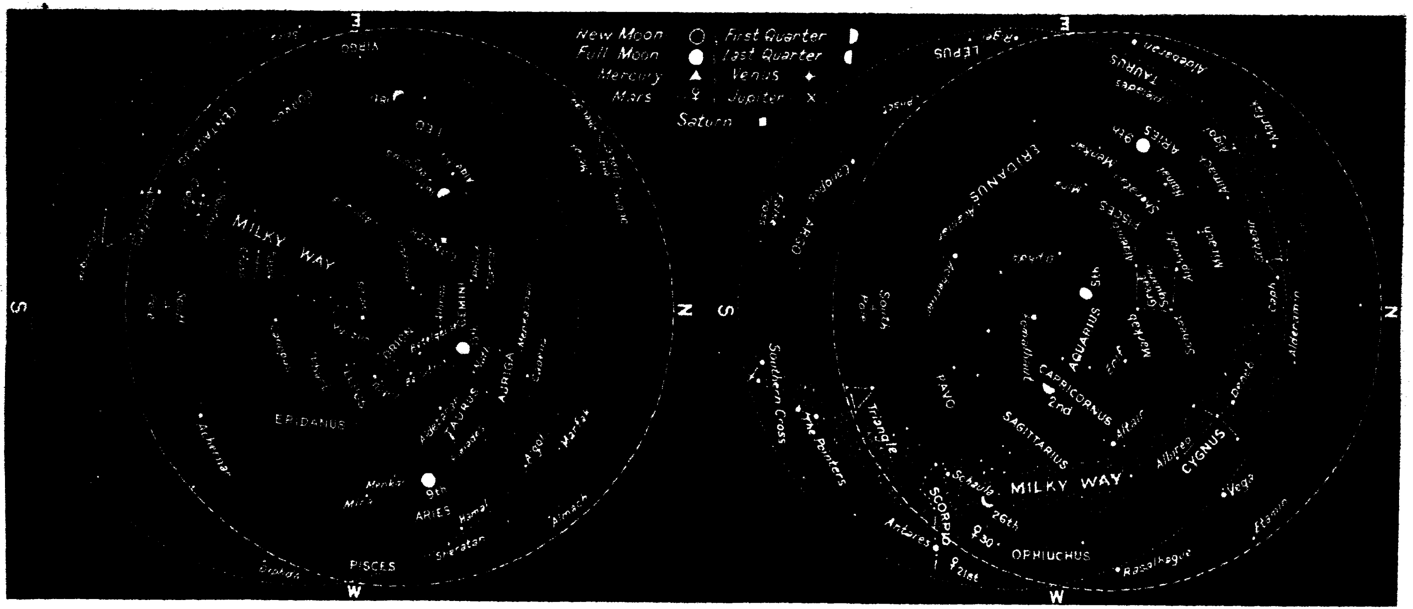
Mercury.—At the beginning of the month, in the "head" of Scorpio, will set about 2 hours after the sun. It will pass 3 degrees to the north of Venus on the 1st and 1 degree to the south of Mars on the 15th. It will be in line with the sun on the 21st, after which it will become a morning object, and on the 30th will rise about 1 hour before the sun.

Venus.—Setting between 8.10 p.m. and 9.15 p.m. on the 1st, Venus will be in line with the Sun on the 17th and will then set at sunset and rise at sunrise. After this date it becomes a morning object and on the 30th will rise between 3.30 a.m. and 4.30 a.m.

Mars.—Now too close in line with the Sun for observation.

Jupiter.—Also too close in line with the Sun for observation at the beginning of the month, but by the end of the month it may be seen low in the east in the morning twilight. It will then rise between 3.30 a.m. and 4.30 a.m. about 15 degrees south of true east.

Saturn.—Will rise a little after midnight on the 1st and between 10.30 p.m. and 11.30 p.m. on the 30th.



Star Charts.—The chart on the right is for 7.15 p.m. in the south-east corner of Queensland to 8.15 p.m. along the Northern Territory border on the 15th November. (For every degree of longitude we go west, time increases 4 minutes.) The chart on the left is for 8 hours later. On each chart the dashed circle is the horizon at Cape York and the dotted circle is the horizon along the New South Wales border. When facing north hold "N" at the bottom; when facing south hold "S" at the bottom and similarly for the other directions. Only the brightest stars are included and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus, at the beginning of the month the stars will be in the positions shown about 1 hour later than the time stated for the 15th and at the end of the month about 1 hour earlier than that time. The positions of the moon and planets, which are continually changing in relation to the stars, are shown for certain marked days. When no date is shown the position is for the middle of the month.

NEPTUNE

ORCHARD SPRAYS

Oldest Established and Well Known on Australian Market

Protect Your Investment

with

NEPTUNE RED SPRAYING OIL

Protect your trees against Red Spider and Scale Insects and tone them for the new season.

NEPTUNE PALSOL

Use for same purpose as Red Spraying Oil; may be combined with Lime Sulphur, Bordeaux.

NEPTUNE CLARIFOL

A dormant or semi-dormant Spray, use in combination with Lime Sulphur, Bordeaux or Black Leaf 40.

NEPTUNE WHITE SPRAYING OIL

For Citrus Fruits, Apples and Pears, Stone Fruit; either straight or in combination with Lead or Black Leaf 40.

Neptune Oil Co. Pty. Ltd.

(INCORPORATED IN NEW SOUTH WALES)

Branches in all States. Agents in all Fruit Growing Areas.

NS 451 B

Volume 63 Part 5

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

NOVEMBER, 1946

Issued by Direction of
THE HONOURABLE H. H. COLLINS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

PAGE.

Event and Comment—

The Year in Agriculture 259

Field Crops—

Grassland Development in Tropical Coastal Areas 261

Fruit Culture—

Harvesting and Packing Lemons .. 270

Applied Botany—

The Devil's Fig 280

Plant Protection—

Pin-hole Borers in Deciduous Fruit Trees 282

Answers to Correspondents—

Hairy Indigo 283
Goosefoot 283

The Dairy Industry—

Observations on Dairy Production in New Zealand 284
Production Recording 296

The Pig Farm—

Selection of the Boar and Sow .. 298
Trucking Pigs to Factories .. 301

Animal Health—

The Tuberculin Test 302
Registered Hatcheries 305

PAGE.

General Notes—

Staff Changes and Appointments .. 308
Milk Board 308
Northern Pig Board 308
Egg Board Boundaries 308
Wild Life Preservation 308
Drought Relief 309
Stock Food Standards—A Warning .. 309
Southern Cane Growers' Executive .. 309
Proposed Central Queensland Egg Board 309
Tanning Hides and Skins 309

Rural Topics—

Another Big Shearing Tally .. 310

Gadgets and Wrinkles—

A Useful Smother for Grass Fires .. 312
A Useful Fire Beater 312

The Farm Home—

The Baby Who Cries too Much .. 313
Dishes from Cold Meat 314
Vegetables on the Menu 315
Queensland Weather for October .. 316
Rainfall in the Agricultural Districts .. 317
Climatological Table for October .. 317
Astronomical Data for Queensland .. 318

STATE'S SEEDS

★

ARE
GOVERNMENT
TESTED

★

	Bushel s.	d.
Beans—Brown Beautys - -	70	0
Beans—Canadian Wonders -	75	0
	Lb.	
Saccaline—Bag Lots - -		3½
Less than Bag Lots		4
Pumpkins—Beaudesert - -	5	0
Pumpkins—Cattle - - -	2	6
Rape—Dwarf Essex - -	1	1
Rape—Giant Kangaroo - -	1	2

ASK FOR YOUR REQUIREMENTS

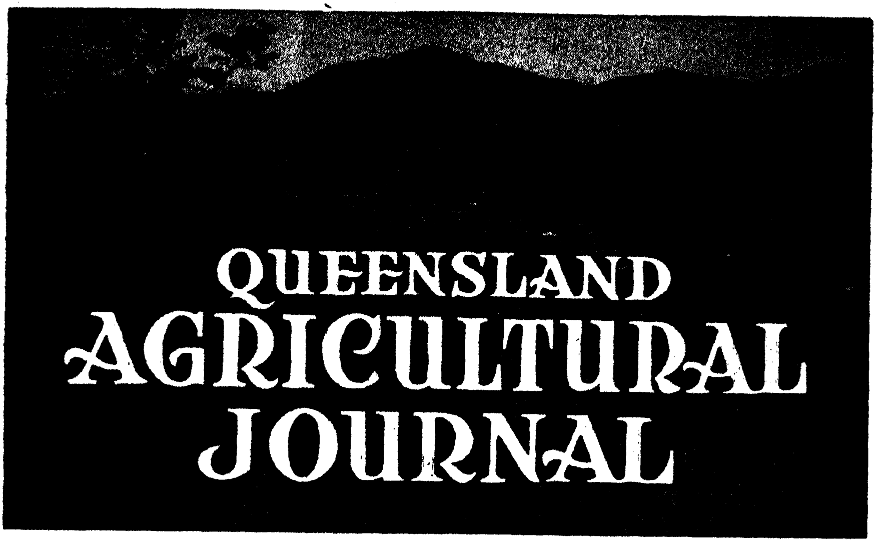
SUDAN SEED

Prime, regraded, recleaned.
Free Johnson grass and other weeds.

	Lb.
Bag Lots - - - -	**7d.**
Less Bag Lots - - -	**7½d.**

State Produce Agency Pty. Ltd.
ROMA STREET BRISBANE

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, including postage. General Public, **Ten Shillings**, including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Volume 63 1 NOVEMBER, 1946 Part 5

Event and Comment.

The Year in Agriculture.

IN his annual report to the Minister (Hon. H. H. Collins), the Under Secretary of the Department of Agriculture and Stock (Mr. R. P. M. Short) reviewed departmental achievements and general progress during the year ended 30th June last. In the course of a comprehensive commentary Mr. Short said:—

Departmental reorganization to provide for more extensive advisory and research services became effective during the year, which was one of substantial progress. Under the new divisional formation the ground was cleared for further advancement.

Regional experiment stations are in process of establishment in important agricultural centres. At the old-established station at Biloela activities are being extended further into the field of general agriculture, and it is planned to include facilities for work in animal husbandry, particularly dairying and pig raising. The departmental property at the Hermitage, near Warwick, has been reopened and there attention will be given to problems of wheat, grain sorghum, and maize production. Methods of soil conservation and pasture management will also be investigated. All these lines of inquiry should be of great value to farmers of the Darling Downs and neighbouring districts. Problems of dairying, piggery management, and lamb raising will likewise be studied at this station. At Nambour, a horticultural experiment station has been established, at which problems of fruit production are under investigation. In the Far North, the departmental property at Kairi, too, will become a centre for experimental work, particularly on maize, lucerne, and pastures. There attention will also be given to animal husbandry and other matters of especial interest to the farmers of the Atherton Tableland and contiguous districts.

Crops new to Queensland agriculture are under investigation. The Director of Agriculture is at present on a mission to the United States of America and Canada inquiring into various aspects of primary industry, giving special attention to soy bean varieties, their characteristics and cultivation. It is probable that as a result of this mission the soy bean will eventually become an important factor in our agricultural economy.

Work at the Bureau of Tropical Agriculture, South Johnstone, has continued along lines laid down in previous years, particular attention being given to grasses and legumes of potential importance to the dairying and pastoral industries. Plans have been prepared for resuming horticultural investigations at Kamerunga, near Cairns.

General agricultural experimental work was continued in consonance with the design discussed in the last annual report. It included a wide range of varietal trials, fertilizer experiments, and the laying out of observation plots in respect of tobacco, oats, grain sorghums, potatoes, cowpea, peanut, linseed, sunflowers, and other crops. A comprehensive series of cotton experiments was continued at the Biloela Regional Experiment Station. Departmental plant breeders concentrated on work in wheat, oats, cotton, and grain sorghum—the cereal section of the work being carried out at Kincora, Roma, and Biloela; the grain sorghum work at Biloela and Kingaroy; and the cotton work in the cotton-growing districts, as well as at Biloela.

Horticultural experimental and plant breeding operations also received attention in the course of the general research activities of the Department. Weed pest problems likewise were investigated. Other experimental work included investigations into transport and storage problems of fruit and vegetables.

Entomological inquiries were directed largely to the possibilities of D.D.T. and other new insecticides for pest control. Plant pathological and botanical investigations proceeded more or less along the same lines as in the previous year and on somewhat the same scale.

Considerable attention also was given to soil surveys and to soil and water problems, including the causes and methods of prevention and control of erosion.

These and other developments are obviously of great value to the primary producers of Queensland, to whom results will become progressively available through a strengthened extension service.

Sugar production is estimated at 644,287 tons of 94 n.t. sugar. Based on this estimate, the 1945 production exceeded that of 1944 by less than 1,000 tons. The quantity of cane harvested was 4,551,982 tons. Consequently, 7·06 tons of cane were required to produce 1 ton of 94 n.t. sugar; this is only the third occasion in the past fifteen years on which more than 7 tons of cane have been required. The c.c.s. value of the cane was the second lowest recorded in this period, and this is obviously the main contributing factor.

Farmers are realizing more and more the benefits to be derived from the application of scientific methods, especially in respect of plant breeding and protection and the maintenance of soil fertility. The Department is collaborating with the producers in finding the answers to rural problems and the practical results already achieved have accelerated progress in primary industry and, consequently, added to the general prosperity of the State.

Field Crops

Grassland Development in Tropical Coastal Areas.

T. G. GRAHAM, Adviser in Agriculture.

THE wet tropical belt of North Queensland, bounded on the east by the sea and on the west by the Great Dividing Range, is a comparatively limited tract of country of varying width and extending some 150 miles from north to south. It is a highly productive area devoted for the most part to the production of sugar cane, tropical fruits, and timber, and to a very limited extent to dairying and cattle raising.

For very many years it was the practice to raise and fatten a few cattle on the coast, and some of these were grazed on introduced grasses such as Para grass, known to old residents as "marram" grass. About ten years ago, however, there was a marked quickening of interest in cattle fattening on the coast and the late Mr. Brice Henry imparted considerable impetus to the idea. He contended that store cattle could be obtained from the back country, brought to the coast, and topped off within the year to be sold at remunerative figures. Others have carried the project a stage further and today a number of graziers is actively interested; some hundreds of acres have been ploughed and planted to exotic grasses for cattle fattening on the far north coast.

Prior to the quickening of interest in fat cattle raising, it had been shown that dairying could be undertaken in favoured localities, but the expansion within recent years has been towards the range, where the areas are elevated and broken and, in some cases, extremely rough. Such areas normally call for the greatest skill in pasture management and, as they are subject to heavy tropical downpours, the difficulties and many disadvantages will be readily understood.

GRASSES.

Several exotic grasses were known to do well along the coast long before the increased interest in coastal fattening occurred, but it is only within recent years that attention has been given to them in an attempt to define their adaptability. As was to be expected in country carrying such dense tropical vegetation, introduced grasses have proved to be of most value, and among these Guinea, Para, and molasses grasses are of most importance.

Guinea Grass.*

The best cultivated grass for the tropics is unquestionably Guinea grass (Plate 103), a native of tropical Africa, of which three forms are at present under observation, namely, common Guinea grass, fine-stemmed Guinea grass, and purple top Guinea grass. Guinea grass grows luxuriantly in the wet season and withstands dry conditions better than most other grasses during the drier months of the year; it is thus suited to both wet and dry districts. It will stand heavy stocking and is remarkable for the manner in which it recovers after grazing. All varieties are erect and tufted and, if allowed to get out of control, grow quite tall and become stemmy. On the other hand, if properly managed, their habit of growth can be changed considerably and low dense tufts of leafy growth will result. The grass must be heavily grazed and then spelled until it becomes leafy again, and at no time should excessive growth be allowed to take place. During summer months, when the rate of growth is out of all proportion to the rate of stocking, if the herd numbers cannot be increased to cope with this condition, a mowing machine should be used where possible to remove the stems. On areas where mowing cannot be practised it is a good plan to burn the stubble annually, and a flame thrower will be found helpful in this respect. Guinea grass is inclined to fall away in phosphate content during the drier months of the year, but deficiency in the diet could be obviated by providing the stock with phosphate in the form of licks.

Plate 103.

A Guinea Grass Pasture.

The seeding rate of reasonably fertile seed is 6 lb. per acre. Sometimes a mixture is used to give a quick cover, in which case the following seeding is recommended:—4 lb. Guinea grass and 3 lb. molasses grass per acre.

---

* *Panicum maximum* vars. *typica, trichoglume* and *coloratum.*

Para Grass.*

Commonly known as "panicum," this grass is most useful in swamps, flats, and low-lying wet localities generally (Plate 104). A native of South America and Africa, it has now become established over most of the tropical world. It spreads by means of long runners which branch freely at the nodes, and though it is a rather coarse-growing grass, its large succulent leaves are relished by stock. During dry conditions, however, the protein content of the grass falls rapidly and growth is appreciably slowed. Some care should be exercised in management of Para grass, since if grazed too closely weeds tend to make their appearance. The aim of the grazier should be to leave one foot of cover over the surface of the ground, except in very favoured localities, such as alluvial river flats, where a low dense cover can be maintained. The latter, however, is possible only under conditions of rotational grazing. Over the past five years the collection of seed has been developed and it is now possible to obtain excellent stands from seed, which should be sown at the rate of 4 lb. per acre.

Plate 104.
A Para Grass Pasture.

Molasses Grass.†

Molasses grass is a straggling grass which, because of its rapid germination and subsequent growth, is most favoured for establishing pasture on newly cleared scrublands, particularly on hillsides and steep slopes. It forms a good ground cover and is able to cope with weeds and other troublesome growth. The great disadvantage of

---

* *Brachiaria purpurascens.*

† *Melinis minutiflora.*

Plate 105.
A YEAR-OLD STAND OF MOLASSES GRASS ON A SCRUB BURN.

molasses grass lies in the fact that it will take fire readily and, if the field is carrying considerable growth, the heat can be so intense as to wipe a stand right out, necessitating resowing (Plates 105 and 106). A good deal of care should be exercised in its management, since it is more sensitive to grazing than either Guinea or Para grasses. Molasses grass will not stand continuous grazing and it has come into disfavour in some quarters because of the erroneous belief that it will not remain as a permanent pasture species. Under rotational stocking it persists

Plate 106.
SHOWING THE EFFECT OF A FIERCE BURN ON THE STAND OF MOLASSES GRASS SHOWN IN PLATE 105.

and can be relied on to provide a good quantity of feed; moreover, under this system of management, especially if intensified, the danger of fire is reduced to a minimum. Molasses grass maintains a reasonably high protein content throughout the year, but appears to be somewhat deficient in calcium. This being the case it is wise to supplement the pastures with licks designed to supply the deficiency.

The seeding rate of molasses grass sown alone is 4 to 5 lb. per acre.

LEGUMES.

The introduction of legumes into the pastures of North Queensland has occupied the attention of the Bureau of Tropical Agriculture since 1936. The importance of this work is apparent when the valuable part that legumes play in any pasture is realized. Having a relatively high protein content, legumes are capable of raising the protein level of a pasture, a particularly valuable feature when the nutritive value of the grasses is declining rapidly with the approach of maturity. Grass in itself is a balanced ration for stock when it is in the young stage and in active growth. Under average conditions on the coast such growth lasts for about nine months of the year if the pasture is handled properly. It is for the remaining three months of the year that a legume can be of great value in balancing the pasture. In addition to this, legumes enrich the soil in nitrogen by means of nodule-forming bacteria on their roots and thereby help to build up and maintain the fertility to a level suitable for the growth of desirable grasses.

Many legumes are pioneer plants, that is to say, they can be established on eroded or worn-out soils and will in time build up soil fertiity to a level suitable for the growth of desirable grasses.

Differences in root penetration and in response to climatic factors often enable legumes to make growth during seasons when grasses are growing slowly; therefore, by a careful selection of legumes the grazing period of a pasture can be considerably prolonged.

Quite a number of legumes has been tried over the last ten years. Their place in a pasture, however, has not yet been worked out, but there is evidence to show that some of them can be successfully established in pastures. Brief descriptions of the more important legumes tested are dealt with here.

Puero.*

This plant is indigenous to the East Indies and is used extensively in the East as a cover crop for rubber. It is a vigorous perennial rambler, and though somewhat slow in the early stages of growth it begins to take charge after four months and can provide a complete ground cover in six months. Stock are very fond of this legume and will graze it bare if allowed free access to it. On this account there is danger of overstocking and the paddock should be spelled frequently to avoid this. At the present time puero seems to hold most promise for admixture with Para grass where the latter is growing in well-drained situations. The legume can easily be established from runners spaced 6 ft. x 12 ft., or from seed. Seed is difficult to obtain, for, while the plant bears a profusion of flowers, seed-setting is extremely light owing to the constant attack of the bean pod borer. Puero can be relied on after the first season to provide 10 tons of green material per acre per annum.

---

* *Pueraria phaseoloides.*

Centro.*

Centro is a native of South America and has been developed within recent times mainly as a cover crop in tropical areas. It is a perennial twining plant which shows a marked tendency to climb, and forms a good cover over the surface of the ground in about four months from seeding. The legume is grazed by stock when they become accustomed to it. It is a heavy seeder, but considerable difficulty is experienced in harvesting, as the seed pods do not mature uniformly, and in addition the crop is hard to mow. It will regenerate itself quite freely and appears to do well with Guinea grass where the latter has been subjected to judicious management. Seeding at the rate of 4 lb. per acre is recommended.

Calopo.†

Calopo, a native of South America, is a quick-growing aggressive legume which was introduced into the East as a cover crop. It establishes itself well from seed either in a fallow or on newly burnt scrubland, and is capable of forming a dense cover over the surface of the ground in four months, completely choking out all weed growth. Calopo is a prolific seeder but is not as hardy as puero or centro, being affected by cold weather much more readily. So far stock have not shown a marked liking for the plant, but they have been observed to eat it during the drier months of the year. For rejuvenating worn-out lands calopo should prove very satisfactory. Owing to its vigorous nature it may not be suitable in a pasture mixture, but much depends on its palatability and the ability of the grazing animal to keep it in check. Grazing trials with this legume singly and in combination are in progress at the Bureau of Tropical Agriculture. Seeding at the rate of 3 lb. per acre is recommended.

Stylo.‡

An introduction from South America, this plant for a number of years was known as *Stylosanthes guianensis* or Brazilian lucerne, but is now commonly called stylo. It is a plant with a very wide range of adaptability: it has been grown successfully on a wide range of soil types and seems to thrive in dry as well as in extremely wet localities; it is tolerant of acid soils but not of swampy conditions. Stylo is an upright plant resembling lucerne somewhat in appearance, but if allowed to grow into large plants it becomes very woody. If large plants are cut back close to the ground the stand is thinned out considerably, as most of the plants fail to survive drastic defoliation, but if kept short it develops into a leafy plant and will last for many years. From its habit of growth, stylo would appear to have some promise in tropical pastures under careful management.

Divergence of opinion exists as to the palatability of stylo. At certain times of the year stock appear to take to it readily; at other times it is left ungrazed. It appears certain that when stock become accustomed to it they graze the plant quite readily and keep it in the short leafy stage.

Stylo develops a large quantity of seed which matures unevenly and while the seed-heads are still green. This presents harvesting difficulties but, under good conditions, the crop can be cut, cured and threshed to recover a fair percentage of seed. Where facilities are available, as much as 300 lb. of seed has been obtained from an acre by cutting and drying out on covers which collect the seed as it is shed. At the Bureau of Tropical Agriculture a yield of 110 lb. of seed per acre has been recovered by mechanical means. The plant can be readily established from seed in prepared seed-beds (fallows) or in pastures that are already established. Seeding at the rate of 2 lb. per acre is recommended.

---

* *Centrosema pubescens.*

† *Calopogonium mucunoides.*

‡ *Stylosanthes gracilis.*

Samoan Clover.*

This is a twining herbaceous plant from the Pacific Islands introduced into Queensland about fifteen years ago. It is palatable to stock, recovers quickly after stocking, and is a prolific seeder. The pale yellow flowers appear on upright stems, and each flower gives rise to a jointed pod which easily breaks at the joints. The pod is covered with a large number of minute hairs and readily sticks to the hair of animals; the plant is disseminated in this manner. Samoan clover makes its growth in areas of abundant rainfall under tropical conditions. It is being tried at the present time in combination with purple top Guinea grass and also with *Paspalum scrobiculatum* and gives promise of being one of the most useful legumes for the far north. Seeding at the rate of from 1 to 2 lb of seed per acre should be sufficient.

Desmodium heterophyllum.

A native of Mauritius, this legume is a perennial prostrate herb with trifoliate leaves and pale purple flowers. It forms a close sward and should prove useful in combination with prostrate grasses. Under natural growth and free from grazing and clipping, the plant grows upright into a diffuse leafy mass draping itself over a network of trailing stems. The plant is palatable to stock and will stand close grazing. Efforts are being made to study this legume in combination with various grasses. Unfortunately, it does not set seed readily and the pods are developed in the body of the foliage, making harvesting difficult. The pods are small and contain two or three medium-sized seeds. The plant spreads readily by means of runners which root freely at the nodes. Seeding at the rate of 3 lb. per acre is desirable.

Sarawak Bean.†

This legume, a native of the West Indies, was introduced into Queensland as a cover crop. It does well under partial shade but is a poor seeder. Small yellow flowers are produced on short racemes which are usually borne close to the ground, rendering harvesting difficult. The plant is a low, creeping, perennial herb of rather weak growth. It is slow in establishment but under most conditions will eventually suppress weeds. It prefers the lighter types of soils, though it does quite well on heavier lands. While it is a shallow-rooting, moisture-loving plant Sarawak bean can adapt itself to extremely dry conditions. Tests are under way to determine its palatability and also its permanence under stocking. Seeding at the rate of 3 lb. of seed per acre will be found sufficient.

---

* *Desmodium scorpiurus.*

† *Dolichos hosei.*

PASTURE ESTABLISHMENT.

Tropical pastures need very careful handling in the initial stages of establishment if successful stands are to be obtained. A good deal of time and expense can be saved if sufficient attention is paid to detail.

The aim of every new settler should be to arrange that his scrub is "fallen" some months before the commencement of the wet season. July and August are considered the best months on the coast. An exceptionally heavy burn is not desirable; all that is necessary is to prevent regrowth by fire and, in the process, remove all rubbish and some of the timber. This should provide sufficient ash for a good seed-bed. An intense burn can do a considerable amount of harm by destroying organic matter. Further, land that has been subjected to intense heat bakes on the surface, rendering germination of young seeds difficult. Fierce burning also aids run-off by altering the soil structure.

No time should be lost in setting about sowing after a field has been burnt. It is necessary to ensure that the seed is planted before rain occurs, so that a good early germination is obtained, resulting in a quick cover which combats weed invasion and soil erosion. Only good quality seed should be used, for ideal planting conditions do not occur frequently and, if the greatest advantage is not taken of them, a field can be very seriously damaged The rate of seeding will depend on the species planted, but it should be sufficiently heavy to ensure that a good cover is afforded. It is better to seed too heavily than too lightly. The quantity of seed used is generally so small and the seed so light that it is often necessary to mix it with sawdust in order to be certain of a uniform distribution. Sawdust should not be mixed with the seed until broadcasting is about to take place, since poor germination sometimes follows if new sawdust has been mixed with the seed some days in advance of sowing.

A careful watch should be kept on germination and wherever bare patches occur these should be resown at once.

Under no circumstances should the pastures be grazed too early. It is imperative that grasses should become well established and form a dense cover before stock are allowed access to the paddocks. It is always wise to ensure that the first grazing is light, even though a good stand has been established. Where for some reason or other solid stands have not been established, it is advisable to allow grasses to go to seed in the first year of establishment to enable the stand to thicken. By periodically examining a young stand for the appearance of noxious weeds any undesirable growth can be checked before it becomes troublesome. At no stage should sucker growth be allowed to get the upper hand.

MANAGEMENT.

The aim of every stock owner is to have a continuous supply of nutritious feed and this can only be achieved by careful pasture management. It has been clearly demonstrated that controlled grazing is one of the most vital factors in pasture management and failure in this respect has been largely responsible for deterioration of pastures in many localities.

If stock are allowed free access to large paddocks they tend to graze the area selectively, concentrating on particular patches and allowing others to become rank and coarse. They also foul the pasture by excessive trampling and resting. Proper attention cannot be given to a pasture if stock have access to it continuously. It often happens that bare patches need reseeding and this cannot be done while stock are roaming over the area; whereas, if the total area was effectively subdivided, individual paddocks could be closed until the desired improvements had been carried out

Grasses are ordinarily easier to maintain in a pasture than are legumes, because their growing buds are not exposed to the same extent as in legumes. Hard continuous grazing thus tends to eliminate the legumes and special care is often needed to maintain them. Occasional resting of the paddocks is necessary to allow the legumes to recover, build up plant food, and set seed. On the other hand, undergrazing sometimes encourages too tall a grass growth, the shading effect of which is harmful to low-growing legumes.

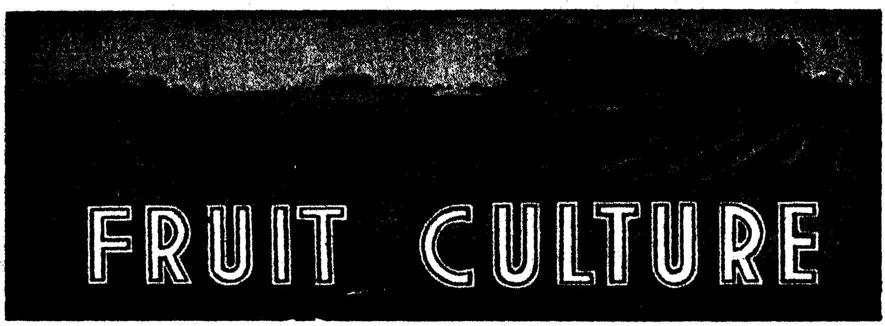
If the best is to be obtained from grazing land, therefore, the grazing must be controlled. Rotational grazing—or grazing the pasture when it has reached a suitable stage of growth and then resting for a fresh growth to appear—is the key to successful grazing management. When rotational grazing is put into practice the pasture is grazed short in a few days—ten days or less; it is then rested and then grazed again. The time which it takes to graze pasture bare depends on the number of stock and the rate of growth. The length of rest a field must be given depends on the rate of growth. In the flush from February to March, a fortnight's rest would be ample; at other times it may be a month or so. From the point of view of the pasture the rest is essential if the pasture is to be maintained in a sound condition and if the maximum amount of nutritious herbage is to be secured. From the point of view of the animal, rest periods of one month or longer are perfectly satisfactory.

When a field has been grazed down and cleared of stock, any grass which the animals have left should be mown with the mowing machine. This is particularly necessary with Guinea grass, which quickly becomes coarse and rank if not properly handled. During dry weather, however, the mowing machine must be used with care, for it is advisable to keep a good covering of grass to prevent the sun from baking the land, thus leading to slow recovery when rain falls.

Later in the season, as the grasses become more fibrous and stemmy with a lower feeding value, too much energy is expended by highly productive animals if they are forced to graze the pasture down. Therefore, the stock should be divided into two lots; the first pick of a pasture should be given to the most productive animals and the cleaning up done by the least productive animals—dry cows or store stock.

In spite of the difficulty sometimes encountered in establishing legumes and the care necessary to maintain them, their inclusion in a pasture mixture is regarded as a basic feature of sound grassland husbandry. It has been found that feeding animals on a legume-grass pasture is more profitable than feeding them cut feed.

It will be apparent from the above that, where suitable grass-legume combinations are secured, great care in management is necessary to maintain these associations in the desired ratio, otherwise the work will be doomed to failure.



FRUIT CULTURE

Harvesting and Packing Lemons.

C. G. WILLIAMS, Horticulture Branch.

THE successful marketing of good-quality lemons depends to a large extent on the methods employed in harvesting, handling, and packing. Quality in lemons coupled with good appearance in case lots obtain better sales, and present a more attractive and satisfactory article to the public. With proper preparatory attention, undesirable features, such as thick and scaly skin, badly coloured, over-large, and poor juice content types, will be eliminated. Observance of the following points will do much to achieve this objective.

Picking Stage.

Lemons are best harvested at a stage known as silvering, which occurs between the change in colour of the skin from dark green to pale yellow. If the fruit is allowed to remain on the tree until is is fully coloured it may deteriorate in quality and become large and coarse.

The ideal size for market requirements is within the 2½-inch diameter range of packing counts.

Harvesting.

It is most important that the skin of the fruit be protected against injury and the resultant entry of mould infection, and to this end gloves should be worn during harvesting and subsequent handling operations. If gloves are not worn at least care should be taken to see that finger nails are kept short to avoid any damage to fruit. The lemons should be closely clipped from the tree with a suitable blunt-nosed type of secateur and placed in a clean, shallow box or basket.

The fruit should be removed carefully from the filled container into a larger box or tray and stacked in the shade under the tree for subsequent transportation to the packing shed.

Large picking bags should be avoided because the weight of fruit may cause skin damage, particularly to the bottom layers of fruit.

Grading and Preparation.

The lemons must be removed to the packing shed as soon as practicable after harvesting. To avoid unnecessary handling it is desirable to grade for size, colour, and quality, and reject diseased and imperfect specimens at the time when the lemons are removed from the harvesting container. Dirty fruit should be carefully washed and thoroughly dried. After grading, culling, and, if necessary, washing and drying, the fruit should be placed in shallow trays 3 feet long by 2 feet wide by 3 inches deep, stacked in a cool place in the shed, and sweated for a period of approximately ten days to remove moisture from the skin. It is essential that the trays be stacked in a manner which will allow good air circulation around the fruit. Following the sweating period the lemons may be cured and, if desirable, artificially coloured.

Curing.

Correctly cured lemons may be stored for a period of several months, provided they are handled carefully to avoid skin abrasions and the relative humidity is maintained at 85-90 per cent. One method of curing lemons involves wrapping each fruit in sulphite wrapping paper and storing loosely in shallow paper-lined trays stacked in a suitable place in the shed. At intervals of about ten days it is necessary to examine each fruit and reject all mouldy or unsatisfactory types, then rewrap and replace in the stack until curing is completed. In maintaining humidity at the required level a humidifier may be cheaply constructed by hanging a series of absorbent cloths from a frame above which is fixed a small perforated iron water pipe, allowing water to drip when required. The air in the shed may be circulated by means of a small fan.

Artificial Colouring.

Although lemons will change colour naturally at relatively high temperatures, more rapid and uniform colouring is obtained by treating the fruit with ethylene or acetylene gas at controlled temperatures. The fruit must be picked at the silver-green stage, as fruit picked before this stage will not develop a satisfactory colour after treatment. The rind may also be injured if the fruit is picked during damp weather. Temperature, humidity, and gas concentration must be carefully controlled; failure to do this commonly results in uneven and poor colouring, damage to the rind, and dropping of the buttons. The process is usually carried out in gas-tight rooms or under a canvas, tarpaulin, or wooden cover. The quantity of ethylene necessary for coloring depends on the type of fruit, but a concentration of one part of gas to 5,000 parts of air is sufficient for lemons placed in gas-tight rooms. A concentration of one part of gas to 2,000 parts of air is recommended for rooms which are not sufficiently gas-tight, but higher concentrations than this should be avoided as they have no further effect on colouring and may cause injury to the skin. Ethylene is supplied in cylinders with a measuring gauge attached, and the required concentration of gas is introduced into the centre of the room at floor level. While ethylene is recommended for colouring, acetylene can also be used. This latter gas is generated by treating carbide with water; 1 oz. of carbide generates sufficient gas for 75 cu. ft. of air space. In calculating the volume of air-space no account is taken of the space occupied by the cases. The displacement of gas caused by the volume of case material does not make any appreciable difference in the result of the treatment. The required quantity of carbide is placed in a container and water is allowed to drip slowly on to it. If the water is added quickly large quantities of gas may be generated and may injure the rind.

The fruit should be spread on trays or in open field boxes stacked on a false floor and each tier separated to provide good air circulation throughout the stack. After the fruit has been placed in position the room is sealed and the required amount of gas is introduced. The room is ventilated every four hours by opening doors or vents or raising the cover. A fresh charge of gas is then introduced. Adequate ventilation is essential, especially in airtight rooms, in order to prevent the accumulation of carbon dioxide, which tends to retard the ripening and gives the fruit an unpleasant flavour. Forced air circulation is often necessary to avoid large temperature differences within the stack, which may cause uneven colouring. For this purpose fans should be installed in the ceiling near the centre of the room and directed towards the floor. It is important to obtain a high humidity during colouring, as low humidities retard colouring and cause an excessive loss of moisture from the fruit. In hot, dry weather it may be necessary to soak the picking cases in water and to raise the humidity of the room by injecting steam, sprinkling the fruit with water or hanging wet bags in the room.

The room may be constructed of timber, brick, concrete, or fibro, and insulated with sawdust, shavings or other suitable material. It can be made more gas-tight by lining with paper, but tarred paper is not recommended because it absorbs ethylene. Large doors should be constructed at opposite ends of the room to provide rapid and efficient ventilation. If sufficient doors cannot be provided then large ports should be built into the back wall or ceiling. The optimum temperature for colouring lemons is 65 deg. F., and in cooler months the rooms may have to be heated with electricity, steam, or a fuel burner. The heaters are placed in the centre of the room, and the temperature should be raised gradually. Thermostatic equipment can be used to control the temperature automatically.

During warm weather the fruit should be either picked in the morning or cooled down in the packing shed before it is placed in the colouring rooms.

Ethylene forms an explosive mixture in air concentrations greater than 3 per cent., and, although this concentration is very much greater than that recommended for colouring, care should be taken to keep naked lights away when the gas is being handled. Ethylene cylinders should be kept outside the colouring room and smoking should not be allowed in the immediate vicinity.

Packing.

Lemons are packed in the Australian dump case, the internal measurements of which are—18 inches long by 8⅝ inches wide by 14¼ inches deep. The standard method of the diagonal count system of packing is easily applied in this case.

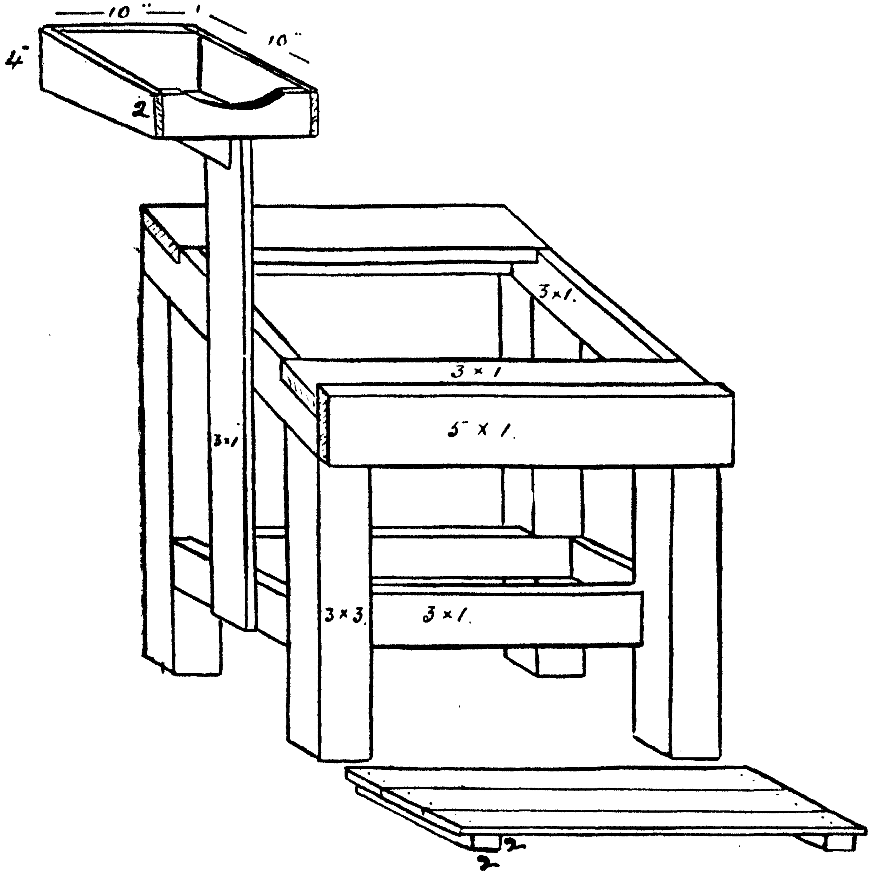


Plate 107.

Packing Stand with Wrapping Paper Holder and Spring Board.

This stand is tilted and holds two cases. The tilt assists the packer by keeping the lemons in position. By packing two cases of different sizes (within a quarter-inch grade range) at the same time the operator is assisting himself in his sizing.

Sizing.—Before packing is attempted it is essential that the fruit be graded into the sizes applicable to standard counts, namely, 2 inches, 2½ inches, 2¾ inches, and 3 inches.

To determine the size, when a mechanical grader is not used, the fruit may be passed through grading rings or through a piece of three-ply in which holes of the specified sizes are cut. A lemon that will pass through a 2½-inch ring with the stalk up but will not pass through a 2¼-inch ring is classified in the 2¼-inch range. The principle in this method of grading is that a fruit that will pass through a ring of a certain diameter but will not pass through the next lower size ring will be classified according to the size of the ring retaining it.

Although fruit may be graded in eighths and sixteenths of an inch, for most practical purposes the grade size is stated in ¼-inch graduations. However, it is possible to get two or three different counts within this ¼-inch range. It is therefore necessary to brand on the case-end both the size and number of fruits in the case.

If the lemons have been hand-graded into trays, boxes, or on to a bench a suitable packing stand will be necessary. If they are to be packed from the bins of a mechanical grader not provided with a packing platform a similar movable stand will be required adjacent to the bin. A stand suitable for the purpose is shown in Plate .

Wrapping.—It is desirable to wrap each lemon in sulphite wrapping paper when packing for market in order to avoid as far as possible contamination by mould from adjacent fruits and also to protect the fruit from mechanical damage during handling and transit. The wrapping paper should be folded over the fruit to form a tail in the middle of the under side of the lemon, thus making a pad for the fruit to rest on, either on the bottom of the case or in the spaces of the previous layer.

Types of Pack.—The type of pack to be used depends on the size of the fruit. The system of diagonal packing is the same for all sizes, but the arrangement of the fruit will depend on the size of the fruit and the type of case. For instance, lemons having a diameter of from 2 to 2¼ inches are packed in the Australian dump case across the width of the case, in an arrangement of alternate threes and twos; this is known as the 3-2 pack. For larger fruit ranging from 2¼ to 3 inches only two fruits should be placed in each row across the case, and this is called the 2-2 pack. The advantages of correct packing are that fruit of a given size will always come to the correct height in the case, and the number of fruit in the case will always be the same for each size.

By using the packing stand illustrated the cases are slightly tilted, which helps to keep the fruit in position, thus making packing easier. The packer stands with the two cases to be packed in front of him, with the fruit on one side of the cases and wrapping paper on the other. A bench containing the fruit should be so constructed that it is tilted so that the fruit is always within easy reach of the packer.

3-2 Pack.—In the 3-2 pack the first layer (Plate 108) is started by placing a lemon in each corner of the case and one exactly midway between them facing end to end in the case, the stalks facing the packer and the nipples facing to the other end of the case. This forms a line of three lemons with two spaces or pockets between them. The pack is continued by placing two lemons in these spaces, which leaves two pockets between the two lemons. Then three lemons are placed in the next pockets and then alternately two and three until the layer is finished, except for the last line of fruit, which is reversed with the stalks facing the wood of the case-end furthest from the packer. To start the second layer (see Plate 110) place two lemons in the pockets formed by the first two lemons of the first layer, then two and three alternately facing as in the first layer, until all the pockets of the first layer are filled, again reversing the last line of fruit across the case. This process is repeated layer by layer until the case is filled. With the 3-2 type packs containing eight or nine layers are obtained (see Plate 112 and packing table).

3–2 PACKS.
First Layers

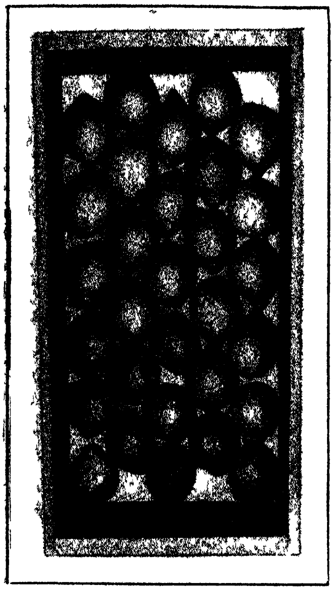


Plate 108.
3-2 Pack. 6 × 6 Layers. 9 Layers

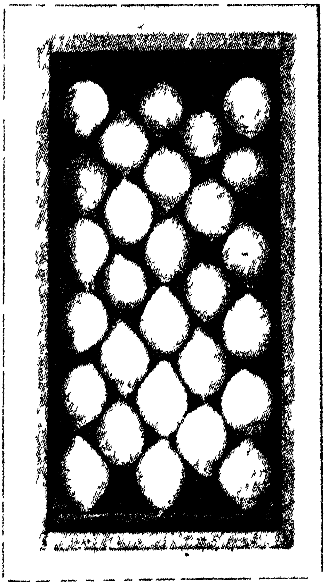


Plate 109.
3 2 Pack. 6 × 5 Layers. 9 Layers.

HOW TO START THE SECOND LAYERS

3–2 PACK.

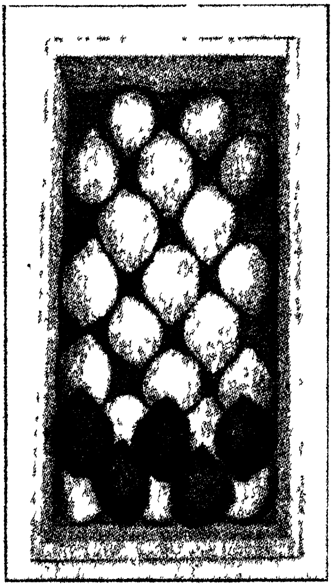


Plate 110.
Note how the lemons are placed on the pockets or spaces of the first layer, the second layer starting with two instead of three.

2–2 PACK.

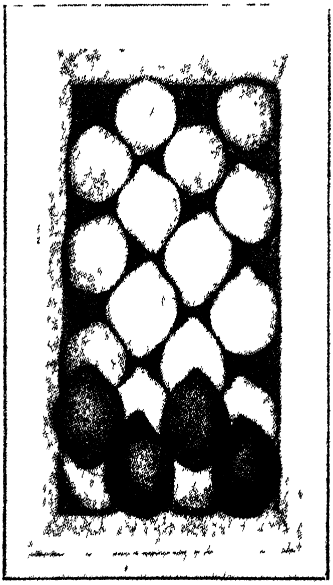
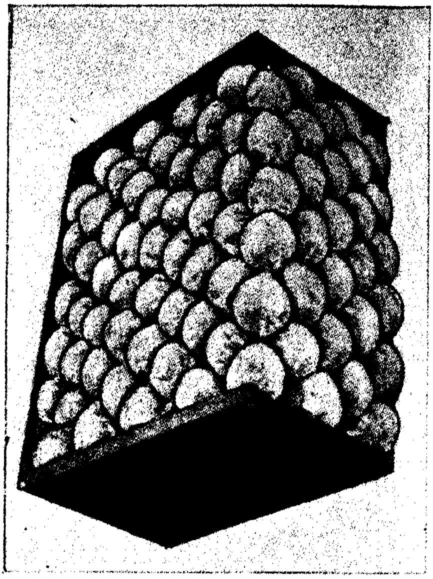


Plate 111.
Note how the first two lemons of the second layer are placed on the pockets of the first layer.

FINISHED CASES.



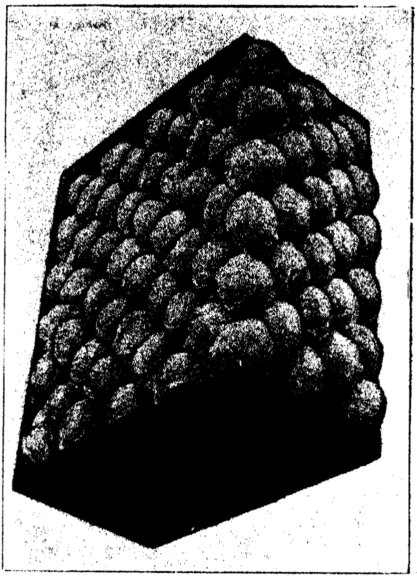


Plate 112.
3–2 Pack. 6 × 6 Layer. Total 270.
Lemons wrapped.

Plate 113.
3–2 Pack. 6 × 5 Layer. Total 248.
Lemons wrapped.

Note the alignment of fruit up and down, across, and diagonally in the case. No two lemons rest one upon the other.

HOW TO READ AND USE THE PACKING TABLE.

The Layer Count is obtained by counting two lines of fruit from end to end in the case, this layer count being 6 × 6.

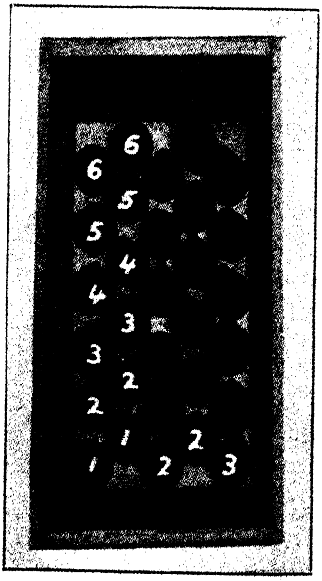


Plate 114.
3–2 PACK.

The Pack gets its name from the way the first five lemons are placed in the layer.

The Layer Count is obtained by counting two alternate lines of fruit from end to end in the case, this layer count being 4 × 4.

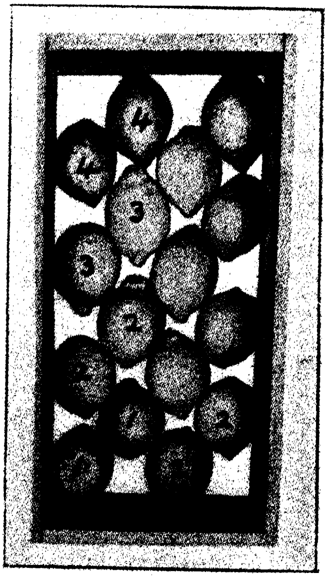


Plate 115.
2–2 PACK.

The Pack gets its name from the way the first four lemons are placed in the layer.

TABLE FOR PACKING IN THE AUSTRALIAN DUMP CASE.

(18 inches long x 8⅜ inches wide x 14¼ inches deep.)

Approximate Size.	Pack.	Layer Count.	Number of Layers.	Total or Count.
2 inches	3 - 2	6 × 6	9	270
	3 - 2	6 × 5	9	248
	3 - 2	5 × 5	9	225
2¼ ,, ...	3 - 2	5 × 4	9	203
	3 - 2	5 × 4	8	180
	3 - 2	4 × 4	8	160
2½ ,, ...	2 - 2	5 × 5	7	140
	2 - 2	5 × 4	7	126
2¾ ,, ...	2 - 2	4 × 4	7	112
	2 - 2	4 × 3	7	98
3 ,, ...	2 - 2	3 × 3	7	84

Special Note.—In the 180 and 203 count the same number of fruit is contained in each layer, but there is an extra layer in the case. This is brought about by the difference in the diameter of the fruit and the size of the pockets. Close attention to the directions in reference to the 3-2 pack will enable the packer to bring fruit to the correct height.

2-2 Pack—This pack is started by placing a lemon in the bottom left-hand corner of the case, and midway between this fruit and the right-hand side of the box a second lemon, leaving two pockets, one between the two fruits and the other between the second fruit and the right-hand side of the case. The next line of two lemons is placed in the pockets formed by the first two fruits, thus commencing the 2-2 pack (see Plates 116 and 117). This is then repeated, the lemons being placed facing as in the 3-2 pack until the layer is finished with all but the last line of fruit, which is reversed, with the stalks facing the wood of the case end furthest from the packer. The second layer is started by placing two lemons on the pockets formed by the first two fruits of the first layer (see Plate 111). The layer is continued by placing lemons on all the pockets of the first layer and reversing the last line of fruit as was done with the first layer. This procedure is repeated, layer by layer, until the case is filled. Two-two packs give seven layers of fruit (see packing table).

Bringing the Pack to the Correct Height in the Case.—Lemons should be packed 1 to 1½ inches above the top of the case, and eased gently into position before applying the lid. After nailing both lid and bottom of the case should show a bulge. Care should be taken that the bottom of the case is kept clear of the floor or nailing-down stand. This can be done by placing a block under one end of the case while easing the fruit into position and nailing.

After two or three layers have been packed the experienced packer can judge fairly well how high the fruit will come in the full pack. Faults in height may be corrected by making the pockets smaller by slightly increasing the size of the fruit used, thus keeping the fruit higher in the box to correct a pack which will come too low or, in the case of a pack that is coming high, to open the pockets by using slightly smaller fruit. Usually these faults are caused by a variation in sizing the fruit in subsequent layers after placing the first layer in position.

2–2 PACK. 7 LAYERS.
First Layers.

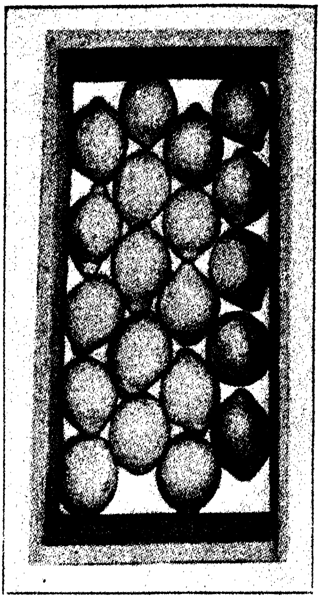


Plate 116.
2–2 Pack. 5 × 5 Layers. 7 Layers.

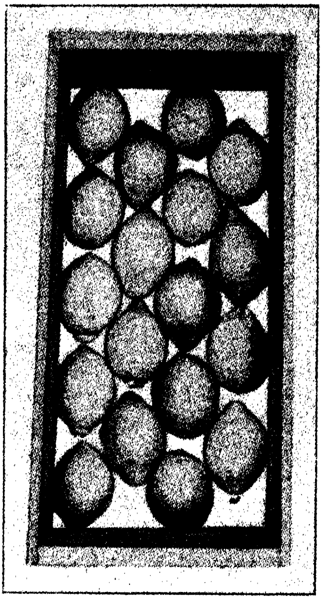


Plate 117.
2–2 Pack. 5 × 4 Layers. 7 Layers.

FINISHED CASES.

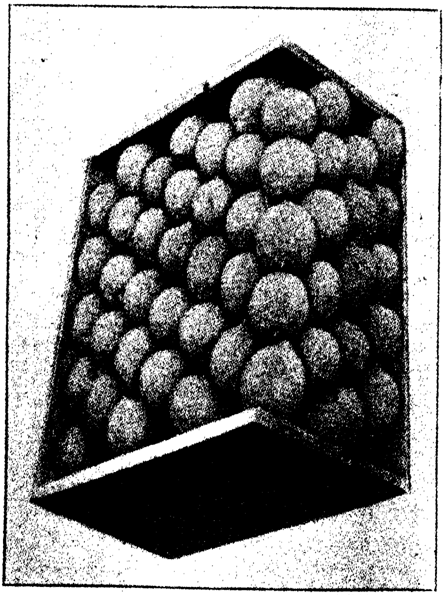


Plate 118.
2–2 Pack. 5 × 5 Layers. Total 140.

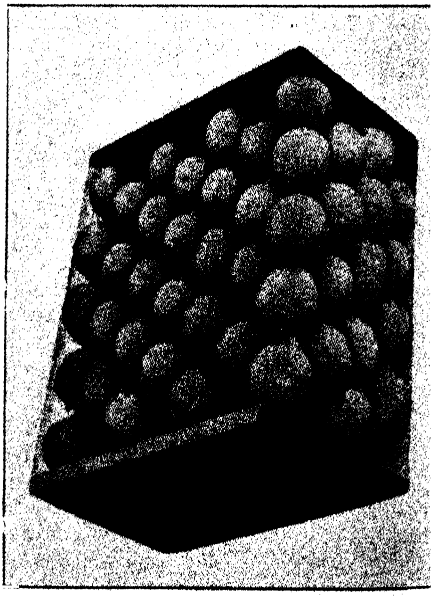


Plate 119.
2–2 Pack. 5 × 4 Layers. Total 126.

General Notes on Packing.

Packers should observe the following notes in packing:—

(1) Each fruit should be placed on its cheek facing end-to-end in the case.

(2) Reverse the last two or three lemons, as the case may be, in each layer.

(3) See that all fruit appears in straight lines from end to end in the case, across and diagonally.

(4) No two lemons must rest directly upon one another, but in the pockets of the layer beneath.

(5 The size of the pockets governs the height of the fruit in the case.

Stencilling and Labelling.

Growers may make their cases look more attractive by neat stencilling and attractive labels. Under the Fruit and Vegetables Act it is necessary for the packer to brand on the case his initials, name, and address legibly and durably within a space measuring not less than 5 inches long by 2 inches wide. The name of the variety of fruit and size and count should also be branded in letters of not less than ½ inch in length. Wiring is recommended in all cases, and a machine for this purpose can be obtained commercially.

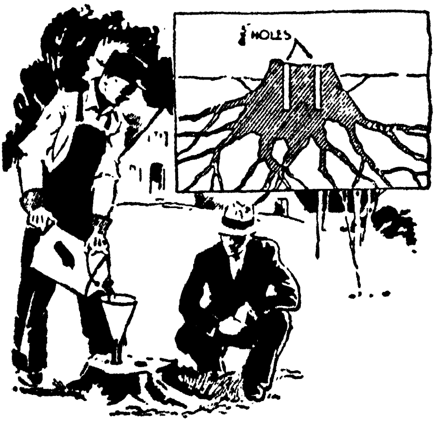
BURNING STUMPS.

One good suggestion for a method of treating stumps of recently felled trees in order to prevent them from sending up shoots is to apply kerosene to the stump, as shown here.

Some ¾ in. augur holes are bored downward through the top of the stump and kerosene poured in.

The effect of the kerosene is said to be to kill the roots, and at the same time to assist in burning the stump much earlier than is possible under other conditions.

One augur hole and one application is sufficient for a small stump up to 3 in. in diameter, but for larger stumps it is necessary to make several holes and to repeat the filling once or twice a week for a month, owing to the more extensive spread of the roots.



—*From "Handy Farm and Home Devices and How to Make Them."*
(J. V. Bartlett for War Blinded Association, Adelaide, S.A.), 1946.

APPLIED BOTANY

The Devil's Fig.*

C. T. WHITE, Government Botanist.

THE devil's fig is a prickly weed that of late years has spread considerably over parts of coastal Queensland, and at the request of some northern Shire Councils it has been declared noxious throughout the State. The following account is therefore offered that Council officers and the farming and pastoral public generally might be acquainted with it, should it make its appearance in their areas.

Description.

A large scrambling shrub, the branchlets and foliage densely clothed with hairs, slightly rough to the touch on the upper and soft on the lower surface of the leaves, where the clothing of hairs is particularly dense. Stems armed with strong, stout, straight or slightly hooked prickles, a few more slender ones sometimes seen on the leaves. Leaves 3 to 6 in. long, 2 to 3 in. broad, the edge of the leaf irregularly lobed with broad shallow bays. Flowers white, about ½ in. diameter, borne in clusters on short, stout stalks in the leaf axils or on the branches. Berries globular, ½ to ¾ in. in diameter, yellow when ripe.

Distribution.

A native of tropical America, now a naturalized weed in most tropical countries. In Queensland it is essentially a weed of coastal "scrub" areas from Wide Bay northwards. It is never likely to be a pest in inland parts. The furthest inland record is Childers.

Properties.

The plant belongs to a dangerous family—Solanaceae—and seems to be left wholly neglected by stock. Fowls eat the berries. It is reported that the berries are eaten raw or cooked in Java, and for this reason the plant is protected and even sometimes cultivated by the natives.

Common Names.

Devil's fig seems to be the name almost universally used, though in some places it is known as "Dirran Curse," a name more correctly applied to a native and allied plant (*Solanum hamulosum*).

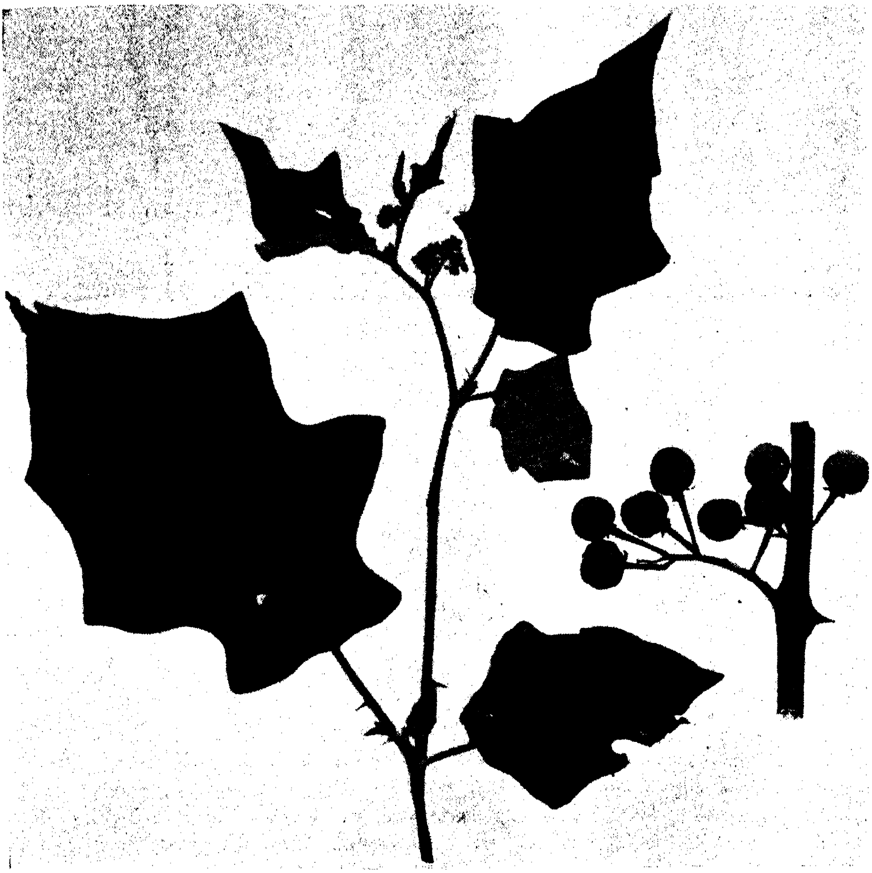


Plate 120.
THE DEVIL'S FIG.

Eradication.

No experiments have been carried out by the Department in the eradication of this weed. Isolated patches or individual plants are best grubbed out, or stems cut off with a brush hook and if large enough swabbed with an arsenical weedicide. Cutting and burning on larger areas is not likely to prove permanent. Spraying would aid but is not generally effective in preventing regrowth in strong growing plants of this type and, as the plant is essentially a weed of coastal pastures, there is a great danger of stock being poisoned by the sprayed weed or even the subsequent ash. A tractor-drawn triangular drag of flanged steel rails has been used with some success in the eradication of groundsel bush and a similar implement or a modification of the mallee roller might prove effective with the devil's fig.

---

* *Solanum torvum.*

PLANT PROTECTION

Pin-hole Borers in Deciduous Fruit Trees.

N. E. H. CALDWELL, Entomologist.

IN the last three years, pin-hole borers have attracted attention in the deciduous fruit orchards of the Granite Belt, where they appear to have been responsible for the death of a number of trees. The insect was not previously recorded from that area and its exact identity has not yet been determined. Other borers, of course, infest deciduous fruit trees, but they are of quite minor importance.

Apples and plums constitute the majority of the trees known to be attacked by the pin-hole borer and at least seven varieties of apple and six varieties of plum are involved. In addition, three varieties of peach, three of apricots, and one each of cherry, nectarine, and pear are included in the host list.

Effect on Tree.

Frequently, a certain amount of weeping takes place at the small, inconspicuous borer holes in the bark. This sap exudation is most copious on apples, but it has also been observed on other deciduous fruit trees. However, weeping is not necessarily associated with pin-hole borer attacks and is, in fact, often absent on plums. A certain amount of gumming may also occur, particularly in peaches. Subsequently, the foliage on one or more limbs may wilt and finally the tree itself dies. Such an unexpected collapse of the tree is often the first indication to the grower of pin-hole borer activity.

The acute symptoms shown by infested trees in most cases seem out of all proportion to the mechanical damage caused by the tunnelling beetles. It is therefore inferred that the insect is a vector or "carrier" of either a fungal or bacterial disease organism, a well-known habit of certain closely related species in other countries. This inference is supported by a pronounced brown to blackish internal staining of the wood above and below each borer hole.

Description, Life History, and Habits.

The adult borer is a Xyloborid beetle measuring slightly more than one-sixteenth of an inch in length and changing in colour with age from the light, creamy-brown of the young insect to the blackish-brown of older individuals. Entry into the tree is made by the adult insects through small pin-holes excavated in the bark and wood. These holes are usually concentrated in the trunk and lower portions of the main limbs, though they have been found up to 6 feet from the ground. The small, more or less straight tunnels lead to irregular-shaped brood chambers or galleries which mostly run with, rather than against, the grain. They may be located at depths up to 1½ inches in the wood. The largest so far encountered covered an area of about one square inch and comprised three superimposed tiers separated from each other by a thin layer of wood.

In the brood chambers, the female beetles lay small, elongate-oval eggs, from which emerge the cream-coloured larvae or grubs. These feed, not on the plant tissue, but on a fungus growing on the walls of the brood chamber. Such feeding habits are common to this and some related borers and have given rise to the name of "ambrosia beetles." When full-grown, the larvae pupate within the brood chambers. Thus all stages of the insect may be associated together in the one gallery.

Attacks by insects of the pin-hole borer type are usually confined to dead, dying, or at best, sickly trees, but the pest species at Stanthorpe may have more destructive habits. Many of the infested trees were obviously not particularly robust before the attack took place. Nevertheless, some rank amongst the best in the orchards concerned and appear to be quite up to the average standard of vigour for the district.

Control.

Borer control in any type of tree presents many difficulties, but it is obviously sound practice to reduce sources of infestation wherever possible. For this reason, growers should remove and burn immediately all dead and dying limbs or trees in the orchard. These trees may harbour large numbers of pin-hole borers, and their destruction will lessen the risk of further attacks.

Measures designed to prevent infestation and also to eliminate borers from trees already attacked are being investigated.

ANSWERS.

Selections from the outward mail of the Government Botanist.

Hairy Indigo.

W.B. (Mundubbera)—

The specimen is the Hairy Indigo (*Indigofera hirsuta*). This plant is widely spread through coastal Queensland to India. It is not known to possess any harmful properties. It has been reported, particularly from the Rockhampton district, that stock, especially horses, have eaten it readily. It is sometimes seen as a weed of cultivation. It is not Groundsel Bush, and is nothing like so aggressive as that plant.

Goosefoot.

J.V.S. (Murgon)—

The specimen is *Chenopodium carinatum,* a species of Goosefoot. This plant would certainly give a strong flavour to milk and cream, but dairy stock have not been seen eating it in any quantity, if at all. The plant contains a prussic-acid-yielding glucoside, and has been known to cause the death of travelling sheep in New South Wales. It is a native plant, but is frequently seen as a weed of cultivation.

Observations on Dairy Production in New Zealand.

E. B. RICE, Director of Dairying.

(Continued from page 219, October, 1946.)

RESEARCH AND INVESTIGATION ON PRODUCTION AND ANIMAL HEALTH.

Research and investigations on various aspects of dairy production and the health of dairy cattle have been carried out by the Dominion Department of Agriculture, the Dairy Research Institute and the Herd Improvement Department of the Dairy Board. Notes on the nature of the projects being investigated at research institutes and on statistical and other investigations follow:—

Department of Agriculture.

The Department of Agriculture operates two research stations, which deal with the production and health of dairy stock. Ruakura Station (C. P. McMeekan, B.Sc. Ag., Ph.D., Director) is charged with the responsibility of studying dairy production problems; it consequently is only concerned with diseases in relation to dairy production and not specifically as veterinary problems. Wallaceville Station (I. Cunningham, B.Sc., Ph.D., B.V.Sc., Director) is primarily engaged on studies of the health of dairy stock.

Ruakura Research Station.

Ruakura is within one mile of Hamilton, the main town of the Waikato, the most intensive dairying area in New Zealand and possibly in the world. Among other stock, the station carries 500 head of dairy cattle including 300 milkers. The station does not confine its researches specifically to dairy production. The work of the station is organised into five main sections—Animal Nutrition, Animal Breeding, Animal Fertility, General Biology, Chemistry.

Animal Nutrition.

Most of the projects in this, as well as other sections, are of a long term nature.

Nutritional Studies of Pastures.

Primarily the nutritional investigations are designed to map the whole field of grass and pasture feeding of dairy stock. It is of fundamental importance to know, for instance, how much grass a cow is capable of eating, and how this and the nutritional value are affected by factors —such as species, stage of growth, and pasture management—under New Zealand conditions. An attempt is being made to determine the influence on the lifetime performance of dairy cattle of two major kinds of pasture nutrition as it exists in New Zealand, viz., a high, even level of nutrition typical of that existing on well managed, rotationally grazed pastures characteristic of progressive farmers, and an uneven (up and down) level of nutrition exemplified by most farms. For this investigation portion of the station has been set aside as two farms of approximately 60 acres each. One is subdivided into 3-acre paddocks and the other into paddocks each of 15 acres. The studies extend over the whole life of the dairy cow.

Nutrition of Calves.

There is a wide variation in the herd wastage on different farms and especially in the proportion of calves dropped to those which enter the herd at two years of age.

In conjuction with this investigation, it is proposed to study the effect of management from the pre-calving period to two years of age on the subsequent lifetime performance—production and disease incidence—of the animal.

The calves on the farm, which is subdivided into 15 acre paddocks, are reared in accordance with normal farm practice. They receive whole milk for the first month; then being gradually changed over to separated milk. Each calf gets up to 2½ gallons of skim milk daily, in two feeds. They are not rotated in the pasture paddocks.

The calves on the other farms are fed whole milk for four weeks, after which the changeover to separated milk is begun by replacing whole milk with separated milk at the rate of one pint for one pint until only separated milk is fed. Free access is also given to crushed oats, each calf getting up to 2 lb. daily. The calves are weaned at three and a-half to four months. As soon as they can eat pasture (at three weeks old) the calves are put in the pasture paddocks, being constantly rotated from paddock to paddock and spending not more than two days at a time in any one paddock.

Striking differences occur in the two groups of young stock. At weaning, the calves reared under the improved system have an average weight of 100 lb. in excess of the other group, at twelve months the difference is 130 to 150 lb., and at two years 170 lb.

Mortality in the former group is nil, as against up to 50 per cent. in the group less favourably managed. This group is treated every three weeks with phenothiazine to control parasites, while the first group does not require such treatment. Dr. McMeekan is of opinion that calves are the most selective grazers of all animals. If kept in one large paddock they will eat only short grass, refusing to touch the longer pastures. As the calves become undernourished despite the available grass, parasites then assume control. It has yet to be ascertained whether the difference noted in the two groups is of parasitic or nutritional origin.

At two years of age, each of the groups of calves is divided into two, one half of each group being moved on to the other farm, so that although there are two herds in practice, four separate treatment-groups are available for study on the animals attaining two years of age. From this age onwards the investigation falls within category (*a*).

Twenty-one sets of identical twin heifer calves have been obtained and will be used for research on nutrition, fertility, &c. A small dairy capable of handling 40 cows is now being established for this work. The animals will, for example, be all treated similarly one season and all, or part, switched over to different conditions in the succeeding seasons. The identical twins are usually similar in habits, keep together, and the same weight to within 1 lb. The use of twins diminishes the variable hereditary factors associated with the use of other stock in any studies on fertility and nutrition.

Animal Breeding.

Research in progress on the breeding of dairy cattle is also chiefly of a long-range character.

A number of theories of animal breeding propounded by statistical geneticists are being submitted to experimental test.

Ruakura is the station at which artificial insemination investigations are proceeding. This work is still in the experimental stages. Special problems arise in New Zealand because of the short breeding season of only about nine weeks' duration. Proven sires, or the sons of proven sires, obtained from farmers, are selected for artificial insemination work. It has been found necessary to keep the yearling sons of proven sires, because of the possibility of the semen of the mature bulls proving inactive. Incidentally the semen of each bull is always examined by certain laboratory tests to test its activity prior to distribution for inseminating farmers' herds. At present, five proven bulls and five yearling sons of proven sires, as supports, are employed on artificial insemination work. The bulls are rotated, each being used one day in five. Four to five bulls provide enough sperm for inseminating 1,000 to 1,400 cows, it being found that the short breeding season reduces the number of cows serviced per bull to about 300 to 400, in contrast with 1,000 in other countries where breeding extends throughout the year. Even 300 calves per bull a season is tenfold the number obtained by natural mating.

The uterine system of depositing the semen in the cow is more effective than the cervical method, but the first method must be performed by a trained man, whereas a layman can use the cervical method. The experience of Ruakura in the different methods has been uterine 71, cervical 51, natural 60, conceptions per 100 services.

No fee is charged co-operating farmers in the artificial insemination work, but they are obliged to keep certain records for the information of the research station and to sell all cull cows to the station.

In conjunction with the artificial insemination investigations, it is proposed to study the effect on a herd of consistently breeding by artificial insemination, using, of course, proven sires. Though the herd was well fed up till the establishment of the station two years ago, its average productivity was low. It has since been heavily culled. As nutrition was always satisfactory, any improvement must come from better breeding.

A slogan used in New Zealand is, "If production is below the district average, feed is the limiting factor."

Animal Fertility.

Failure of dairy cows to breed regularly seems to be a major problem in New Zealand. Farms were inspected on which as high a proportion as 30 per cent. of the cows failed to conceive in the previous breeding season.

As a first line of attack on this problem an attempt is being made with the co-operation of the veterinary clubs to map the relative incidence of different types of female sterility in New Zealand dairy cows. It is not known to what extent female sterility is the result of biological or physiological causes, respectively, and within each of these main groups, the various sub-groups. As a guide to research, it is hoped to get a sample of up to 5,000 dairy cows in an intensive dairying district, and to classify the causes of sterility.

Fertility in bulls is also being studied. For this investigation identical twin bulls are being used.

Biological Section.

In this section the investigations relating to dairying are:—

1. A method of diagnosing pregnancy in cows in the early stages.
2. A method of assaying hormones with the object of picking out calves which will develop into high-producing cows. The economic benefit to the industry of such a means of early identification of future productivity is obvious.
3. Blood grouping in dairy cattle.—There are 30 blood groups in dairy stock. This study aims at classifying the different groups with a view to ascertaining if any relationship exists between the respective blood groups and milk and butterfat production.
4. Milking machines.—Studies on milking machines and machine milking have been carried out. So far as mechanical aspects are concerned, special attention has been given to vacuum gauges and relief valves. Studies on machine milking have dealt with the rate of milking and non-stripping practices. Co-operative studies by the Dairy Board's consulting staff and Ruakara have been made on some phases of machine milking on numerous farms—e.g., machine milking in relation to mastitis.

Wallaceville Research Station.

This station, situated about 12 miles from Wellington, deals primarily with the health of the various classes of livestock. The Dairy Division has also been provided with accommodation for its laboratory, which performs routine and investigational work for the central and southern portion of its North Island activities.

The organisation of the station provides for subdivision of the work into five sections—diagnosis, biochemistry and toxicology, parasitology, bacteriology and pathology.

The diagnostic section operates as a laboratory service for field officers of the Division of Livestock and the co-operatively organised farmers' veterinary clubs. The other sections are engaged in research projects.

As most of the studies at Wallaceville are of a purely veterinary nature—such as bone diseases, ketosis diseases, mastitis and photosensitivity diseases—reference to them is not called for in this report. Because of its implications to Australia, brief reference will be made to the work in the use of Strain 19 vaccine for the control of contagious abortion in dairy cattle. It was the opinion of Dr. Cunningham and others that methods of keeping contagious abortion in check, or at any rate minimizing the disease to a degree which would render it no longer a serious economic factor, have been demonstrated. In a trial in one badly affected district in 1943, of 10,724 heifers vaccinated, only 3 per cent. aborted from all causes, compared with 22 per cent. of the 11,268 unvaccinated heifers. The average incidence of abortion in the whole Dominion in 1943 was estimated to be 12 per cent. In 1944 the number of heifers treated was 110,000, of which only 2·6 per cent. failed to carry a full-time calf. It was suggested that failure to breed in the vaccinated heifers may not have been caused by contagious abortion. The work has been extended this year to provide for the vaccination of 200,000 calves. The calves are vaccinated when four to eight months old.

Another investigation successfully completed dealt with copper deficiency in certain peat lands. The malady called "peat scours" caused acute scours, milk production was lowered and calves were unthrifty—in fact, previously calves could not be reared in some districts.

Top dressing of pastures with 5 lb. of bluestone annually has proved effective in ameliorating the copper deficiency in affected districts. Actually at the time of our visit trials were being conducted in using aeroplanes to distribute the copper salt on a mass scale in one area.

As already stated, cobalt deficiency in certain areas was another soil-mineral deficiency problem in one district successfully overcome.

Dairy Research Institute.

The Dairy Research Institute is situated in the Massey Agricultural College property, about four miles from Palmerston North, the main town of the Manawatu district. It is in the centre of an intensive dairying district. The institute is equipped with farm, factory and laboratories, and its work covers animal husbandry, dairy manufactures, dairy bacteriology and dairy chemistry. There are two dairy herds—Jersey and Friesian. The bulls kept are proven sires, as well as young bulls (sons of proven sires) which are being proven. As the New Zealand sire survey investigations have shown that the dam contributes only 15 per cent. towards the production standard of her progeny, while the proven sire is so prepotent in his breeding efficiency, Professor Riddet believes in keeping every calf sired by a proven bull, irrespective of its dam.

Informed opinion generally nowadays in New Zealand is placing all emphasis on the improvement of dairy stock via the proven sire or the son of a proven sire, in contrast with the old system of selecting a bull on the production records of his nearest female ancestors. Since the insistence on the use of proven sires, the productivity of the

Institute's herd has been confidently maintained and in fact is improving. Previously, even though highly priced, fashionably bred, but unproved, bulls were used, many disappointments were experienced.

The following investigations on dairy production problems are being pursued at the institute:—

Relation of Plane of Nutrition to Milk Production and Milk Composition.

The object of this investigation is to determine the influence of the plane of nutrition of dairy cows on (*a*) health; (*b*) production; (*c*) chemical composition of milk; (*d*) manufacturing quality of milk for butter and cheese.

Twenty cows were kept on a high nutritional plane and twenty on a low plane for a pre-calving period of 80 days. In this time the first group gained 55 lb. and the second lost 66 lb. in live weight. So at calving the average difference in weight of the cows in the two groups was over 100 lb. After calving the two lots of cows were grouped as one and given exactly the same pastures and other management. It was, in fact, difficult in the paddock to distinguish to which pre-calving treatment each cow had been subjected. The original groups had then been combined for three months.

The experiment had not proceeded long enough for any significant results to be apparent. However, the capacity of the dairy cow to recover from the effects of undernourishment is manifestly evident even from the present appearance of the cows which were in the low-plane group before calving.

Calf Feeding.

The value of calf meal as a supplement to separated milk for calves reared on good pasture was investigated. The calves were put into three groups, one lot receiving separated milk only, the second separated milk plus meal, and for the third lot meal was substituted for portion of the separated milk—½ lb. meal replaced its equivalent (4 lb.) of separated milk. All lots had access to good pasture, rotationally grazed. There was no significant difference in the growth rates in the different groups. The results may be interpreted as indicating (*a*) if separated milk is scarce its use can be economised by substituting meal for portion of the milk; or (*b*) there is no value in reducing the separated milk if it is plentiful. The key to the success of this calf-rearing trial on separated milk and pasture was, of course, the rotationally grazed pasture available to the calves.

Feeding of 10 per cent. v. 15 per cent. of Body Weight of Separated Milk to Calves.

The quantities of milk stated would correspond with average and good calf-rearing methods in New Zealand. So far as the work has gone, the advantage is in favour of the 15 per cent. group, but both lots are regarded as entirely satisfactory.

Variations in Solids-not-fat Content of Milk.

A decline in the solids-not-fat content of milk of the Institute herd occurs in December and January (normally a relatively dry period). This is of economic importance, inasmuch as milk for the liquid-milk market may fail to reach the legal standard of composition, while cheesemaking is adversely affected in regard to manufacturing methods, cheese yield and quality. It is desired to find if the lowering of the solids-not-fat is due to summer temperatures or the lower protein and higher fibre content of grass during the period stated. It was shown that on a low plane of nutrition the solids-not-fat content of milk tends to decline. The experiments are being further pursued with a view to ascertaining also the effect of temperature.

Milk Secretion.

Studies are now being undertaken on the hormonal control of lactation.

By the injection of hormones into an empty cow which had already been in milk for 14 months the animal was induced to continue to produce for another season and 400 lb. butterfat were yielded.

In another trial, milk secretion was initiated in a virgin heifer which yielded 160 lb. butterfat in the lactation period. This work is, however, not yet developed to a practical stage. It has been confined mainly to treating cows from which a season's production would have been missed through temporary or permanent sterility. Hormone studies are expected to add to the knowledge of milk secretion.

Use of Thyroprotein to Stimulate Milk Production.

Thyroprotein, prepared from casein and iodine, has been shown to increase the fat percentage and milk yield of the dairy cow; but is without effect on the solids-not-fat content. About 15 to 20 grams are fed daily. The cow's pulse rate also increases from 69 to 85 and the weight drops, but not markedly. Used in excess thyroprotein is definitely harmful. A cow has been treated for a season without ill-effect, but it is not yet known whether moderate use over an extended period will prove detrimental.

Daily v. Less Frequent Testing of Milk for Estimation of Butterfat Production.

The results obtained have indicated a mean variation of only 1 per cent. between the quantity of butterfat produced by daily weighing and fat testing of one day's milking per month. Clearly, then, the results obtained in the herd testing scheme, whereby a visit, one day monthly, is made by the recording officer, give a reasonably accurate estimation of the productivity of dairy cows.

HERD IMPROVEMENT DEPARTMENT, NEW ZEALAND DAIRY BOARD.

The inauguration of the herd improvement plan in 1938 enabled herd recording work to be intensified and detailed information for research and investigation into milk and butterfat production to be assembled. In the latter connection, the Herd Improvement Department has instituted the following investigations:—

Sire survey work to isolate the high breeding strains and encourage the retention of bulls whose daughters have displayed high productive qualities.

In making a survey the following conditions apply:—

(*a*) *All* tested daughters of the bull *must* be included.

(*b*) The average production of each daughter is calculated from all available normal lactations.

(*c*) At least 10 daughter-dam pairs are required for an "official" survey. (It is necessary for the stock to comply with the prescribed identification scheme.)

(*d*) (i.) A "preliminary" survey is issued on the basis of the first lactation for all daughters.

(ii.) An "intermediate" survey is issued when two lactations have been completed by at least eight daughters.

(iii.) A "final" survey is issued when three lactations have been completed by at least six daughters.

Sire surveys completed up to June, 1944, showed that of 1,833 bulls surveyed 26 per cent. left daughters with higher production than their dams, 28 per cent. maintained production, and 46 per cent. decreased production. The difficulty in ensuring an adequate supply of bulls capable of raising herd levels is thus indicated.

The sire survey work also has shown that, within a breed, there has been a general association between high average test and high butterfat production.

A method of sire survey called "the equal parent index," based on the theory that each parent contributes equally to the milk-producing ability of their offspring, is adopted in some countries. The New Zealand investigations have, however, shown that approximately 15 per cent. of the difference within surveys and within herds can be accounted for by inheritance from the female side (in one generation), while the proven sire has a prepotent influence on the productive capacity of his progeny. This is probably the outstanding discovery in all the herd improvement work.

Age Correction Factors.

For sire survey purposes, it becomes necessary to convert the yields of young cows to a mature equivalent. From an analysis of lifetime production records of 1,500 cows, the following factors have been derived for correcting two-year-old and three-year-old cows' productions to a mature basis:—

Age.	Formula to estimate mature butterfat equivalent.
2 years old	75 per cent. of actual production, plus 150 lb.
3 years old	70 per cent. of actual production, plus 140 lb.
4 years old	No allowance.

These correction factors differ entirely from those used in Australia and other countries, but the New Zealand statistics definitely showed that the previously-used correction factors were not valid.

Herd Wastage.

The collection of data on the causes of culling of cows has enabled the main factors to be classified in their order of importance. Reliable information on the extent of the various factors influencing cullings in dairy herds is of much value to departmental and consulting officers in their duties among farmers and to the farmers themselves by enabling them to take appropriate steps in the care of their herds to minimize, so far as practicable, the incidence of their chief causes of wastage.

The table hereunder shows wastage as a percentage of all cows totalling 155,508 in 2,901 herds over the period 1938-1943.

Cause.	Percentage.
Low production	5·63
Disease—	
Mastitis	3·72
Sterility and abortion	2·63
Tuberculosis	0·33
Calving troubles	0·20
Grass staggers, bloat, &c.	0·47
Deaths or sundry diseases	0·89
Total	8·24
Other causes	2·95
Total wastage	16·82

Effective Average Production.

A technical committee determined that the following principles should apply in ascertaining the effective average production:—

1. The total fat used for the calculation should be that supplied to dairy companies for manufacturing purposes (city milk supply herds are excluded).
2. The "effective" number of cows to be taken into consideration in arriving at the effective average production should be the appropriate weighted monthly average number of cows in milk or intended to be milked on properties during the season.

The method of approach to the problem of getting this information is that all suppliers are asked to supply on a fixed day (usually 15th January) the number of cows milked on that day. This is sent to the factory on a label tied to the milk or cream can.

Through the herd recording associations, detailed figures for the number of cows carried on a large number of properties and intended for milking from August to February, inclusive, are collected. This enables the fixing of the ratio between the number of cows in January and the average number which has to be carried from August to February, inclusive, in order to milk that number. It was found that a mean of 104·25 cows is carried from August to February for every 100 milked in January.

Having obtained (and 95 per cent. of farmers supplied the information) from all factories the total number of cows milked on 15th January, this number multiplied by the ratio 104·25 gives the "effective" number of cows carried by suppliers. The butterfat for each supplier for the year is supplied by the dairy factories. This divided by the supplier's "effective" number of cows gives the average production per cow.

The effective average productions in the different seasons were:—

1940-41.	1941-42.	1942-43.	1943-44.
232·7	216·6	207·2	205·1

Other investigational work pursued by the Herd Improvement Department through data collected by herd testers or consulting officers includes:—a mastitis survey, calf nutrition, general herd nutrition, sterility survey, fertility survey.

SIRE SURVEY WORK AND HERD IMPROVEMENT THROUGH BREEDING.

Summary of Conclusions and Recommendations.

Extracted from the Nineteenth Annual Report of the New Zealand Dairy Board.

Conclusions.

(1) Dairy farmers have based their methods of increasing the production per cow on—

- (*a*) Provision of herd replacement by selection of daughters from higher producing dams.
- (*b*) The use of pedigree herd sires from dams with butterfat backing considerably above the average of the herd that the bull is selected to head.
- (*c*) The recording of herds in order to identify high and low producers and to enable—
    - (i.) elimination of low producers;
    - (ii.) rearing of replacement heifers from higher producing cows;
    - (iii.) Data to be obtained for sire surveys.

(2) In regard to herd improvement since 1920 it may be stated that—

- (*a*) The rate of improvement in per cow production has gradually diminished over the past 20 years and is at present practically stationary.
- (*b*) The observed improvement in production per cow in New Zealand since 1920 has been mainly due to improved feeding due to top-dressing, better pasture management, conservation of additional winter feed, and the like, with the associated increase in the length of lactation, and to the rapid change in breed composition of herds, rather than to selection and elimination of low producers.

(3) We have critically examined the data on the above points and are agreed that they are soundly based and fairly represent the position in the higher producing and presumably best-managed herds in the industry. The results of surveys are comparable with, and confirm, the results of similar work overseas. The reliability of the data is improved by the fact that, in many cases, it is based on a much larger number of records than similar overseas work.

(4) In respect of breeding and selection methods the data shows that the proven bull is all important because—

- (*a*) In order to secure an improvement it is necessary that the 17 to 20 per cent. of animals culled each year for disease, low production or other cause should be replaced by animals of higher producing ability.
- (*b*) The improvement possible on the basis of selection of replacements from the higher producing dams is very slow, due to—
    - (i.) Regression of daughters towards the mean.—On the average only 15 per cent. of the dam's advantage is passed on to the progeny.

(ii.) Heavy culling for disease necessitates saving approximately one-third of replacements from cows below the herd average.

(iii.) Rapid expansion in herd numbers by approximately 1,000,000 cows since 1920 has further limited the scope available for selection.

(iv.) Not more than 30 per cent. of cows have even been tested and therefore two-thirds of farmers do not know which are their highest producing cows.

(*c*) The farmer has therefore been reliant upon the herd sire as the chief means of ensuring that herd replacements will be of superior producing ability to the culls they replace.

(*d*) The 1,078 sire surveys conducted to date indicate that only one in three of the bulls surveyed has improved production in the herd in which he has been used, and the net result is that these bulls have been completely unable to improve production.

(*e*) Further, a considerable proportion of the bulls surveyed have been slaughtered before their breeding worth has been determined and are no longer available to the industry.

(5) We believe the present position has arisen because the grade herds in which these bulls have been used now approximate the same level of production as the pedigree stock from which herd sires are drawn.

(6) The difficulties confronting the pedigree breeders in attempting to raise production have been similar to those of the grade herd, but complicated by the pedigree breeders' dual allegiance to type and ancestry as well as performance and his reluctance to cull vigorously on a basis of performance.

(7) The facts set out above disclose a very disquieting position in the industry, and one which can be viewed with complacency by neither the industry nor the breed societies concerned.

Recommendations.

(1) With the object of rapidly raising the average production of pedigree stock we suggest the breed societies should consider—

(*a*) Encouraging by every possible means the use of proven sires in pedigree herds. The aim of the breed societies should be to have every pedigree calf sired by a proven bull.

(*b*) Selective registration on a basis of performance.

(*c*) As a necessary basis for constructive breeding every pedigree herd should be continuously recorded, but the owner should have the option of excluding any cow from the annual herd average by cancelling her registration.

(2) While every endeavour should be made to promote improvement in our pure-bred herds, we believe that more rapid improvement of grade herds can be secured by—

(*a*) The sire surveying of as large a proportion as possible of the sires in use in the industry while the sires are still living.

(*b*) The use of the best proven sires as widely as possible in grade and particularly in pedigree herds by the widespread use of artificial insemination.

(3) In order that as large a proportion of herd sires as possible may be available for survey, action should be taken to further encourage—

- (i.) Continuous recording of as high a proportion of herds as possible in order to provide necessary production data.
- (ii.) Individual identification of all heifer calves reared for dairying.
- (iii.) Running of selected yearling bulls with heifers and the saving of sufficient heifer calves to obtain a reliable indication of the bulls' worth as early as possible.
- (iv.) Retention of herd sires in the industry until such time as the merit of their progeny has been determined by sire survey.

(4) We have reviewed the methods employed in sire surveys and in this connection recommend—

- (*a*) As from the present season the results of all official sire surveys be published irrespective of the results of the survey. For the 1943-44 season only it is recommended publication be withheld if any member makes written objection.
- (*b*) As soon as conditions permit steps should be taken to publish the results of all official sire surveys in graphical or other convenient detailed form.
- (*c*) In order to bring the methods of sire survey into line with our other recommendations, only the first 305 days' production in any lactation should be used in assessing dam or progeny records for sire survey purposes.
- (*d*) Bulls eligible to sire merit heifer calves will be those bulls meeting the basis of qualifications for official proven sires. Such fact shall be indicated in the publication of officially surveyed sires.

(5) It is further recommended that as soon as conditions permit steps be taken to establish artificial insemination centres in the main dairying areas. It is hoped that experience gained at Ruakura during the present season will indicate suitable organisation and technique for such centres.

(6) It is considered that education and publicity are fundamental to the success of the scheme outlined above, and we therefore recommend that—

- (*a*) The Board arrange for its technical officer to produce a bulletin (or bulletins) setting out the results of the herd improvement work conducted to date and the conclusions which may be drawn therefrom, such bulletin to be distributed as widely as possible.
- (*b*) The Board should make the services of its technical officer and its consulting officers available for talks or lectures to groups of breeders, young farmers' clubs, &c., wherever this can be conveniently done. Films or film strips suitable for this purpose should be prepared.
- (*c*) An endeavour should be made to have the judging of dairy stock at agricultural and pastoral shows placed on a sounder basis.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock, which qualified for entry into the advanced register of the A.I.S., Jersey and Guernsey Societies' herd books, production records for which have been compiled during the month of August, 1946 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	AUSTRALIAN ILLAWARRA SHORTHORN.			
	JUNIOR 3 YEARS (STANDARD 270 LB.)			
Rhodesview Royal Primrose 3rd	W. Gierke and Sons, Helidon	8,827·05	367·248	Blacklands Prospector
	SENIOR 2 YEARS (STANDARD 250 LB.)			
Rhodesview Butterfly 4th	W. Gierke and Sons, Helidon	9,424·45	367·738	Alfa Vale Nigel
Rhodesview Biddy 29th	W. Gierke and Sons, Helidon	7,192·3	307·763	Alfa Vale Nigel
Rhodesview Queen	W. Gierke and Sons, Helidon	6,352·05	278·15	Alfa Vale Nigel
Sunnyside Empress 100th	R. Moore, Kingaroy	7,195·85	261·148	Sunnyside Father Christmas
	JUNIOR 2 YEARS (STANDARD 230 LB.)			
Fairvale Laurel 3rd	H. L. and C. I. Bruggemann, Kulpi	6,614·55	299·226	Fairvale Reward
Rosehill Gem 6th	Protheroe Brothers, Lawnton	8,394·16	295·232	Dnalwon Felix
The Corals Silver 4th	A. H. Webster, Helidon	5,814·55	249·814	Blacklands Herdsman
Wandegong Countess 11th	H. G. Watson, Killarney	6,436·55	244·554	Blacklands Courageous 2nd
The Corals Petal 6th	A. H. Webster, Helidon	5,663·25	235·064	The Corals Victory
	JERSEY.			
	MATURE COW (STANDARD 350 LB.)			
Oxford Gracious	W. A. Berderow, Fairney View	6,742·09	400·681	Oxford Ajax
Navua Design's Samaritan	F. Z. Eager, Petrie	6,887·9	353·852	Design's Ruler
Oxford Pamist	Burton Brothers, Wanora	7,618·2	342·366	Oxford Golden Peer
	JUNIOR 4 YEARS (STANDARD 310 LB.)			
Strathdean Deanna	S. H. Caldwell, Bell	6,852·45	450·134	Navua Ladoras Ruler
Westbrook Sylvia 15th	Farm Home for Boys, Westbrook	7,240·6	346·882	Orphanage Comet
	SENIOR 3 YEARS (STANDARD 290 LB.)			
Hocknell Bravo Camilla	N. C. Webb, Beaudesert	7,229·6	432·231	Navua Victoire Lad
Westbrook Tulip 125th	Farm Home for Boys, Westbrook	6,170·55	347·665	Orphanage Comet
Elwyn Mayflower	E. T. Dunning, Woodford	6,579·3	326·517	Glenside Lone Star
	JUNIOR 3 YEARS (STANDARD 270 LB.)			
Trecarne Jersey Lass 4th	J. J. Ahern, Conondale	7,996·46	420·347	Trecarne Some Duke
Westbrook Safety 33rd	Farm Home for Boys, Westbrook	7,077·85	302·684	Mornmoot Clementine's Valour
	SENIOR 2 YEARS (STANDARD 250 LB.)			
Oxford Silver Maid 3rd	W. A. Berderow, Fairney View	6,348·3	355·402	Oxford Maid's Victor
Ashview Joybell	C. Huey, Sabine	6,221·15	310·919	Torquay Prince 2nd
Lermont Colleen 2nd	J. Schull and Sons, Oakey	4,892·35	260·485	Lermont Peer

JUNIOR 2 YEARS (STANDARD 230 LB.)

Kathleigh Pippin I	F. W. Kath, Dalby	7,749·6	434·945	Oxford Daffodil's Victor
Kathleigh Dehlia	F. W. Kath, Dalby	6,922·33	379·98	Oxford Daffodil's Victor
Oxford Feodora	Burton Brothers, Wanora	6,667·63	367·766	Oxford Maid's Victor
Romsey Flo	J. Wilton, Killarney	5,882·6	365·322	Oxford Pixie's Victor
Hocknell Bravo Joy	N. C. Webb, Beaudesert	5,219·65	312·106	Navua Victoire Lad
Trinity Candytuft's Choice	J. J. Ahern, Conondale	6,220·2	305·810	Trinity Crowning Effort
Lermont Locketette 2nd	J. Schull and Sons, Oakey	4,997·40	284·475	Selsey Samaris Hallmark
Woodview Flora	P. H. Schull, Oakey	4,241·75	262·760	Lermont Commander
Lermont Lottie	J. Schull and Sons, Oakey	4,785·7	258·654	Lermont Peer
Lermont Golden Lily	J. Schull and Sons, Oakey	4,524·15	248·309	Trinity Noble Effort
Inverlaw Rejoice (244 days)	A. Huth, Milbong	5,142·7	247·319	Trinity Exchange
Woodview Aileen	P. H. Schull, Oakey	4,267·15	236·237	Lermont Commander
Lermont Nora	J. Schull and Sons, Oakey	4,202·85	231·866	Selsey Samaris Hallmark
Wyalla Bonnie	C. Huey, Sabine	4,025·4	230·373	Trinity Noble Effort

GUERNSEY.

JUNIOR 2 YEARS (STANDARD 230 LB.)

Laureldale Liddy	W. A. K. Cooke, Maleny	6,569·2	367·506	Minnamurra Topsy's Sequel

The PIG FARM

Selection of the Boar and Sow.

E. L. MELVILLE, Adviser, Pig Branch.

THE foundation of a successful piggery is quality stock, well fed and well managed. This can only be attained in the first instance by careful selection of the breeding stock. Too many farmers in the past have been content to use any sort of sows and very often a boar of doubtful ancestry. This must reflect on the quality of our pig meats. The future outlook for pig raising points clearly to the demand for a more uniform type of pig and this can only be achieved by careful selection of breeding stock.

The choice of breed or breeds to select from is for the individual to make, but it would be unwise to purchase pigs of any but the most popular breeds. The more breeders of any one particular breed, the wider the range of selection will be.

Plate 121.

UNIFORMITY OF TYPE IS REQUIRED BY THE TRADE AND IS AN INDICATION OF THE BREEDER'S SKILL AND MANAGEMENT.

Once the breed or breeds have been decided, the next step is to note those particular breeders who have consistently good records as regards type and prolificacy, and if possible favour the breeder who is making an effort to improve his type of stock by carcase appraisal.

The show ring is a guide to type, although one must not be guided by show awards entirely. Inquiries should be made as to the competition encountered when such prizes were gained. A long string of prizes and champion ribbons is of little use in assessing the value of a stud if there was little or no competition at the particular shows at which these awards were won.

Shows, and Royal Shows especially, have been with the help of competent judges the means of raising type over the years to a level equal to that of any country in the world.

The statement is often made that shows have done little to improve our standards, but how else has the improvement in our pigs been made? In the various carcase competitions held throughout Australia it will be found that the winners in every case claim ancestry to show stock. A competent show judge adjudicates with a definite plan of type in relation to commercial requirements.

While it is not necessary to purchase prize-winners, it will be found that certain families or strains within a breed have consistently good records of type and production and it is from these that selection should be made. A purchaser should always insist on seeing the parents of the animals it is proposed to buy, if at all possible, also any other progeny of the same breeding.

Plate 122.

MASCULINITY, CONSTITUTION, AND TYPE ARE ESSENTIAL IN A SIRE.

The age of the pig to buy depends upon the purchaser. Although the older the animal the more certain one can be of selecting the desired type, it is not good practice to select stock under the age of three or, preferably, six months.

The Boar.

The boar is a most important unit of the pig farm as he will be the sire of all the pigs that are bred on the farm, which during his lifetime may number over 1,000. The wisdom of purchasing only the best strains is clearly demonstrated when the sire's capacity to reproduce is realized.

In conformation, the boar should have a good head typical of his breed, wide between eyes and ears with a bright intelligent eye, jaws well formed, not overshot or undershot when viewed from the side, with a well-formed neck of medium length and running smoothly into the shoulders, which should be wide between the front legs and well filled out behind the shoulder and elbow; avoid the pig that cuts in badly behind these points. The back should be straight or slightly arched, of good length without any dip over the loins, ribs well sprung, hams well formed and fleshed down to the hocks and tail set reasonably high. The underline should be even and carry well through towards a flank which should be well let down and thick. The teats should be well spaced and extending well forward towards the front legs; these should be at least 10 in number and, in the case of Large White, the standard of excellence requires 12 well-placed teats. (Teat placing in the boar is important, as it will greatly influence the number and placing of his daughters' udders.) The legs should be straight, of medium length, and set evenly into the four "corners" of the body. The pasterns should be strong and short, slightly sloping to firm compact feet; avoid any splaying or crossing of the feet. The skin should be fine and free from wrinkles and covered with an abundance of fine straight hair. When viewed from the front or back the general conformation of the animal should be level along the sides and into the shoulders and giving that "trim" appearance so necessary for commercial requirements.

Plate 123.

PROLIFICACY AND THE MATERNAL INSTINCT ARE NECESSARY IN THE BROOD SOW.

In general appearance the boar should carry himself with a proud and free action, having visual evidence of his masculinity, character, and constitutional vigour.

Careful handling of the boar when young will do much towards keeping him docile. Bad tempered strains should be avoided, as rarely are they "good doers."

The Sow.

In the selection of foundation stock for the brood sow herd, whether they be pure bred or grade, uniformity of type and conformation is of paramount importance. Their ancestry, like that of the boar, should be of the best within the breed. They should show good body capacity, sound constitution, maternal characteristics, and come from a prolific family.

The sow's conformation is on similar lines to the boar, but whereas the boar may be built on more compact and robust lines, the sow needs to be the feminine version of this type. This may be described as being constructed on a more refined framework without any loss of constitution or vigour and the realisation that ample length and depth of body are essential for the accommodation of her unborn litter and eventually to rear a large litter of healthy pigs.

Young sows should be well fed and kept growing. Sows should not be mated until at least 8 months of age.

Points to remember:—

Select only from the popular breeds and strains of proven blood.
Masculine vigour in the boar.
Maternal characteristics in the sow.
Constitution, character, and commercial suitability.
Prolificacy and docility.
Well fed and housed, success should then be the reward.

TRUCKING PIGS TO FACTORIES.

In view of recent reports of pigs arriving dead or dying in railway trucks at the place of delivery, producers or their agents are strongly advised not to overload railway trucks and to give pigs every possible care and correct treatment before despatch.

It is always an advantage, when pigs have been topped up in enclosed pens, to give them the run of a grazing paddock for two or three days prior to despatch. This accustoms them to exercise and living on their feet, thus they will be better fitted to travel.

The chief causes of deaths in transit are:—

1. Exhaustion, contributed to by overfeeding or feeding too near to the time of loading on the farm, resulting in animals becoming travel sick which lowers resistance to further ailments, distress or accident. Pigs should not be fed on the morning of despatch, but allowed drinking water only.

2. Overloading of railway trucks and particularly the loading of pigs and calves in the same compartment. Under the *Pig Meats Acquisition Plan*, bacon pigs were then being accepted up to 200 lb. dressed weight and this resulted in an increase all round in the weight of pigs received at bacon factories and meatworks and in consequence necessitates a review of the number which should be accepted as proper loading for the various trucks used for this class of stock. It is suggested that loadings be limited as follows:—

F.P. truck—24 to 26 pigs;
L. truck—48 to 52 pigs (24 to 26 on each deck);
M.G.P. truck—80 to 86 pigs (40 to 43 on each deck).

Should extra heavy baconers be consigned the numbers need to be further reduced, also if choppers or backfatters are included the allowance should be on the basis of one chopper or backfatter being equal to two average baconers.

3. Overheating is another frequent cause of loss during transit. Pigs should not be allowed to become overheated and should always be loaded or unloaded by means of a well constructed loading race. If pigs must be marketed during very hot weather they should be delivered to the receiving yards early in the morning and vehicles used should be well covered so as to protect the animals from direct rays of the sun, but allowing for plenty of ventilation.

Sometimes pigs are required to be loaded into the railway trucks late the previous evening for early morning departure of trains. When this is necessary care should be taken to partition off all large or restless stock (old sows and stags) so as to prevent fighting and jostling,

It is wrong to attempt to load exhausted pigs into railway trucks, in the hope that they will recover during the journey, as such pigs rarely survive. However, if given prompt attention and allowed to remain in the resting yards, separated from other stock, they usually regain sufficient strength to ensure safe delivery.

ANIMAL HEALTH

The Tuberculin Test.

A. L. CLAY, Divisional Veterinary Officer.

TUBERCULIN is a digest or extract of tubercle bacilli. It does not contain any of the bacilli themselves and is quite incapable of causing tuberculosis. It was first prepared in 1890 by Robert Koch and at that time attracted as much attention for its possibilities as a cure for tuberculosis as for its use as a diagnostic agent. In the former role tuberculin has not proved a success, but as a diagnostic agent time has shown it to be of very great value. The tuberculin test was first used on cattle in 1891 and is now being used more than ever before, so that it can be seen the test is no mere passing phase of veterinary practice.

What is the Tuberculin Test ?

The test is one designed to determine the presence or absence of tuberculosis in the animal under test. This it does with a high degree of accuracy. It does not, however, give any indication of the extent of the disease in the animal, nor does it indicate whether the animal is shedding tubercle bacilli in its milk.

The test is carried out on the animal itself, not in the laboratory on a blood or milk sample. It consists essentially of the introduction of tuberculin into the animal's tissues and subsequent observation of the effects of such introduction.

How Does the Test "Work" ?

There is no entirely satisfactory explanation of how the test operates. Several different theories have been put forward at various times. Nowadays, it is generally conceded that the tuberculin reaction is allergic in nature; that is to say, the tuberculous animal is in a sensitive state or condition which can be demonstrated by exposing the animal either to contact with tubercle bacilli themselves or (as happens in the tuberculin test) to extracts of these organisms. Sensitivity is revealed, according to the type of test employed, by a rise in temperature, by a swelling at the site of inoculation of the tuberculin, or by a discharge from the eye.

How is the Test Usually Carried Out ?

The test is usually carried out in one or two ways, namely, the subcutaneous or temperature method and the intradermal (intracutaneous) or skin sensitivity method. A third method known as the ophthalmic or eye test method is seldom used nowadays.

Subcutaneous Method.

In this method temperatures of the animal under test are taken with an ordinary clinical thermometer both before and after the injection of tuberculin. Usually, two temperatures are taken before the tuberculin is injected, one in the mid-afternoon and the other just before the time of injection. The two readings are averaged and the figure so obtained is spoken of as the pre-injection temperature.

The injection of tuberculin is usually made between 8 p.m. and 9 p.m. As the name of the method implies, the tuberculin is injected subcutaneously (hypodermically).

Temperatures taken after the injection are spoken of as post-injection temperatures and are taken at the 9th, 12th, 15th, and 18th hours after injection of the tuberculin. The result of the test is determined by comparisons of the pre-injection temperature and the post-injection temperatures.

Intradermal Method.

In this method tuberculin is placed in the skin itself. A mere drop of tuberculin suffices, but the injection is a precision one and requires skill. The site usually selected is one or other of the two folds of hairless skin to be found high up under the base of the tail. The injection is made in this position largely as a matter of convenience, there being no need to shave the skin beforehand. It could be made elsewhere and in fact in England is very often made in the skin over the sides of the neck.

Nowadays, with the improved types of tuberculin available it is customary to make only one injection. With the older types of tuberculin previously in use two injections were required, the second being made 48 hours after the first.

The injection site is examined for the presence of swelling 72 to 96 hours after the time of injection. This is called ''reading'' the test. Animals which exhibit swellings have given a positive reaction to the test, whilst those which do not are negative. The size of the swellings given by positive reactors varies widely but for the most part is something in between a bean seed and an almond nut. Large swellings do not necessarily indicate ''bad cases'' of the disease but simply high sensitivity to tuberculin.

Does Proximity to Calving Affect the Reliability of the Test ?

With the subcutaneous test this question has some point, but not with the intradermal test. However it is not a question of the reliability of the test undergoing change so much as the cow near calving being an unsuitable subject for the test. The high temperatures which cows run as calving draws near make the interpretation of post-tuberculin injection temperatures difficult. As the intradermal test is not dependent on temperature but on skin sensitivity, on which calving has no effect, that test remains quite suitable even when calving is imminent.

Does Feeding Affect the Reliability of the Test?

Heavy feeding during the progress of the subcutaneous test may force temperatures up and thus render the interpretation of post tuberculin injection temperatures difficult, but again there is no question of any effect on the reliability of the test itself. With the intradermal (skin sensitivity test) feeding can be as heavy as may be without any effect whatsoever.

Does the Tuberculin Test Condemn any Healthy Animals ?

Perhaps this is the question most frequently asked by persons having their first experience of the test. It requires to be considered in conjunction with the question,

Does the Test Pass any Animals which are Tuberculous ?

The answer to the second question is an unequivocal affirmative. It is nowadays well recognized that the old-standing advanced case of tuberculosis does on occasion fail to exhibit sensitivity to tuberculin. Fortunately such animals usually reveal themselves by their appearance, but in heavily infected herds it is necessary to be on the look-out for them.

The answer to the first question cannot be stated unequivocally. For one thing it is necessary to be quite clear on how we are going to determine whether an animal is tuberculous or what we expect to see when we carry out a post-mortem examination of a reactor to the test. On the average, cattle exhibit sensitivity to tuberculin about 30 days after they contract tuberculosis. Very little, if anything, in the way of disease can be seen post-mortem at this time, and in general a further 30 days (making 60 days from time of infection) has to elapse before evidence of tuberculosis can be detected with the naked eye with any degree of facility. Even then careful search of the carcase is often necessary as the lesion may be quite small. Often, when lesions are not visible to the naked eye, the presence of tubercle bacilli can nevertheless be proved by inoculating small laboratory animals with material obtained from glands from the tested animal.

It cannot be stressed too much that the routine inspection of cattle at abattoirs (to determine whether meat is suitable for use as food) cannot be expected to reveal all lesions of tuberculosis which are present. It has been shown repeatedly that an exhaustive search often revealed the presence of small lesions of tuberculosis which ordinary meat inspection methods did not detect. This is no reflection on the methods employed, as the detection of small isolated lesions of tuberculosis in the internal organs is not of any significance in relation to judgment on the suitability of the carcase meat for food.

It will be seen, therefore, that when an animal reacts to tuberculin we must not necessarily expect to be able to demonstrate the presence of disease in all cases. It is, notwithstanding, probable that in rare instances animals exhibit sensitivity to tuberculin for reasons other than that they are affected with bovine tuberculosis; but it can be stated, practically with certainty, that this happens far less commonly in Queensland than in many other countries.

Why are Repeated Tests Necessary ?

A single test only reveals those animals which are sensitive to tuberculin at the time of the test. It does not reveal those animals which are infected but have not yet developed sensitivity, nor does it take any account of those animals which may become infected by tubercle bacilli persisting in feed boxes and in pasture after the reactors to the test have been removed from the property. Where reactors are found at a first test of a herd it is very necessary to have repeat tests at intervals of about three months in order to eradicate the disease completely.

Conclusion.

Many farmers in Queensland are at present making their first acquaintance with tuberculin testing and it is hoped that this article will provide satisfactory answers to many of the questions which one is frequently asked in connection with the test. The test has been tried and proved in the hard school of experience over a period of nearly sixty years and stands to-day as one of the most reliable diagnostic tests in veterinary medicine.

REGISTERED HATCHERIES

REGISTRATION of poultry hatcheries entails blood testing and the removal of birds found to be affected with pullorum disease, or are otherwise unsuitable for breeding purposes.

Owner.	Name of Hatchery.	Breeds.
V. H. Allen, Oxley road, Oxley	Alaura	White Leghorns, Australorps, Langshans, and Rhode Island Reds
I. M. Armstrong, Randall road, Wynnum West	Chanticleer	Australorps
P. R. Bach, Cleveland	..	Australorps and White Leghorns
Mrs. E. A. Baltzer, 10 Mary street, Toowoomba	Austral	White Leghorns
J. S. Bauer, Oakwood, Bundaberg	Triangle	Australorps and White Leghorns
Beach Bros., Wellington Point	Brach Bros.	Australorps and White Leghorns
J. M. Beccaris, Harvey's Range road, Townsville	Winova	Australorps, White Leghorns, and Rhode Island Reds
H. Brazil, Beaudesert road, Cooper's Plains	Brazil's	Australorps and White Leghorns
D. L. Burns, Brisbane road, Redcliffe	Yalta	White Leghorns and Australorps
P. J. C. Bygrave, Robinson road, Aspley	Craigan Farm	White Leghorns and Australorps
M. H. Campbell, Albany Creek, Aspley	Mahaca	White Leghorns and Australorps
W. Carr, A. B. and A. T. M. Watson, Logan and Creek roads, Mount Gravatt	Bellview	Australorps, White Leghorns, Minorcas, and Rhode Island Reds
J. L. Carrick and Son, Manly road, Tingalpa	Craigard	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton	White Leghorns
A. R. Chard, Chard's road, Bundaberg	Sunnyland	Australorps and White and Brown Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
A. Cowley, The Gap	Melody	White Leghorns and Australorps
A. J. Daniels, Moongan	Daniel's	White Leghorns, Australorps, Anconas, Brown Leghorns, and Rhode Island Reds
T. Duval, New Lindum road, Wynnum West	..	Australorps and White Leghorns
E. Dearling, Haden	..	White Leghorns and Australorps
V. R. Dearling, 85 Holberton street, Toowoomba	..	White Leghorns, Australorps, and Brown Leghorns
Dixon Bros., Wendecla	Dixon Bros.	White Leghorns
E. Eckert Head street, Laidley	..	Australorps, Langshans, and White Leghorns
A. W. Edwards, Stenner street, Middle Ridge	..	Australorps and White Leghorns
C. L. Eggar, Moggill	Rosehill	Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner	Australorps
Elks and Sudlow, Beerwah	Woodlands	White Leghorns and Australorps
W. Ellison, junr., Bald Knob, Landsborough	Willeden Plantation	White Leghorns and Australorps
B. E. W. Frederich, Oxley road, Corinda	Glenalbyn	Australorps
N. H. Gibson, Manly road, Tingalpa	Gibson's	Australorps and White Leghorns
Gisler Bros., Wynnum	Gisler Bros.	Australorps and White Leghorns
R. T. Green, 116 North street, Toowoomba	..	White, Black, and Brown Leghorns, Australorps, and Langshans
W. G. Gregory, Deeragun	Rocks	White Leghorns, Australorps, and Rhode Island Reds
T. L. Griffiths, Margaret street, Silkstone, Ipswich	Hillcrest	White Leghorns and Australorps
J. W. Grigg, Tumoulin	..	Australorps and White Leghorns
F. P. Grillmeier, Milman	Mountain View	Australorps and Minorcas
T. A. Haggquist, Edmonton	White Rocks	White Leghorns
P. E. and G. G. Hannay, Ridley road, Aspley	Sunnyhill	White Leghorns and Australorps
C. Hartmann, Box 73, Pittsworth	Vigor	Australorps, White and Black Leghorns
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
L. G. Higgins, Middle Ridge, Toowoomba	..	Anconas, Rhode Island Reds, and White Leghorns
F. E. Hills, Sims road, Bundaberg	Littlemore	Australorps, Rhode Island Reds, White Leghorns, White Wyandottes, and Langshans
A. H. Hillenberg, Crow's Nest	..	Australorps
Hodgen Bros., Spring street, Middle Ridge	Austral	White Leghorns and Australorps
A. E. Hoopert, 24 Greenwattle street, Toowoomba	Kensington	Australorps and Rhode Island Reds
H. Hufschmid, Ellison road, Geebung	Meadowbank	White and Brown Legnorns, Minorcas, Australorps, and Rhode Island Reds

REGISTERED HATCHERIES—*continued.*

Owner.	Name of Hatchery.	Breeds.
Mrs. E. R. Hurren, 44A Herries street, Toowoomba	..	White Leghorns and Australorps
H. Jones, Ridgelands	Jolly Farm	Langshans, Australorps, White Leghorns, White Wyandottes
A. J. F. Jull, Stradmore, Ramsay street, Middle Ridge	Stradmore	White Leghorns
W. Kelly, Parkhurst, via North Rockhampton	..	White Leghorns, Australorps, and Rhode Island Reds
R. H. Kennedy, 357 Bridge street, Toowoomba	..	White Leghorns, Australorps, and Rhode Island Reds
F. E. Kipee, 40 Hurlsey road, Toowoomba	..	White Leghorns
E. C. Kolberg, Handford road, Zillmere	Gerbera	Australorps
F. Le Breton, Bald Knob, via Landsborough	Pagoda	White Leghorns
W. A. Lehfeldt, Kalapa	Lehfeldt's	Australorps
W. A. Luke, 108 Russell street, Toowoomba	Downs	White and Brown Leghorns, Australorps, and Rhode Island Reds
J. McCulloch, White's road, Manly	Hindes	White Leghorns and Australorps
A. Malvine Waterworks road, The Gap	Alva	White Leghorns and Australorps
A. Mawhinney, Robinson road, Aspley	Aspley	White Leghorns, Australorps, and Rhode Island Reds
Mrs. P. W. E. Maynard, Doonside, via Dalby	..	Australorps and White Leghorns
W. S. MacDonald, Babinda	Redbird	Rhode Island Reds and Anconas
F. Maxfield, 60 Holberton street, Toowoomba	Braeside	White Leghorns
C. J. Mengel, New Lindum road, Wynnum West	Mengels	Australorps
F. J. Miller, 305 Bridge street, Toowoomba	Rhode Island Red	White Leghorns
J. A. Miller, Racecourse road, Charters Towers	Hillview	White Leghorns
H. H. Millman, Haly street, Kingaroy	Kingaroy	Australorps, White Leghorns, Wyandottes and Plymouth Rocks
F. S. Morrison, Kenmore	Dunglass	Australorps
C. J. Nielsen, Kensington street, Bundaberg	Bona Vista	Australorps, Rhode Island Reds, and White Leghorns
S. V. Norup, Beaudesert road, Cooper's Plains	Norups	White Leghorns and Australorps
H. Obst and Sons, Shepperd	College Holme	White Leghorns and Rhode Island Reds
H. W. and C. E. E. Olsen, Marmor	Squaredeal	White, Black, and Brown Leghorns, Anconas, and Australorps
E. E. Palmer, Greenmount	..	Rhode Island Reds
A. C. Pearce, Marlborough	Marlborough	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell and Runner Ducks, and Bronze Turkeys
W. J. Perkins, 110 Dearling street, Toowoomba	Rhode Island Red	Rhode Island Reds
A. J. Philp, Upper Sheridan street, Cairns	Aerodrome	White Leghorns, Australorps, Rhode Island Reds, Anconas, and Light Sussex
G. Pitt, Box 132, Bundaberg	Pitts'	White Wyandottes, White and Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
Mrs. M. Price, care Post Office, Macalister	..	Australorps and White Leghorns
F. M. G. Proellocks, 81 Herries street, Toowoomba	Vale View	White Leghorns
J. C. and G. E. Raff, Musgrave road, Sunnybank	Brundholme	White Leghorns, Australorps, and Rhode Island Reds
G. R. Rawson and Son, Mains road, Sunnybank	Sunbeam	White Leghorns, Australorps, and Black and Brown Leghorns
C. G. A. Rivers, Tamaree	Tamaree	Rhode Island Reds and White Leghorns
C. Roberts, Trout road, Aspley	..	White Leghorns
J. Rogoff, 423 Logan road, Stone's Corner	Kingston road	Australorps
C. L. Schlencker, Handford road, Zillmere	Windyridge	White Leghorns and Australorps
P. H. Scotney, Priest street, Toowoomba	..	White Leghorns and Rhode Island Reds
J. Schumann, 291 Bridge street, Toowoomba	..	White and Brown Leghorns, Rhode Island Reds, and Australorps
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa	White Leghorns and Australorps
N. G. Seymour, Ipswich road, Darra	Sohufa	White and Black Leghorns and Australorps
R. E. Slaughter, Handford road, Zillmere	Monarch	Australorps and White Leghorns
H. A. Springall, Progress street, Tingalpa	Springfield	White Leghorns
A. W. Stehn and Son, 285 West street, Toowoomba	Red Spot	Australorps, Rhode Island Reds, White and Brown Leghorns
J. P. Skelly, Helidon	Helidon	Australorps and White Leghorns
W. B. Slawson, Fraser road, Mitchelton	..	White Leghorns, Australorps, and Light Breeds
T. Smith, Isis Junction	Fairview	White Leghorns and Australorps
P. W. Stark, Crow's Nest	Austral	Australorps
H. M. Stephens, 160 Barolin street, Bundaberg	Barolin Stud	Australorps and White Leghorns
J. Stevenson, Dragon street, South Warwick	Ivanhoe	Rhode Island Reds, White Leghorns, and Australorps

REGISTERED HATCHERIES—*continued.*

Owner.	Name of Hatchery.	Breeds.
R. Stockman, Kairi	Tinaroo	White Leghorns and Rhode Island Reds
A. H. Tebbutt, Stewart terrace, Gympie	Delrae	White Leghorns, White Wyandottes, and Australorps
A. G. Tietzel, West street, Aitkenvale, Townsville	Tietzel's	White Leghorns and Australorps
R. M. Thomson, Parkhurst, North Rockhampton	..	Australorps
H. G. Thorpe, Box 36, Goomeri	Thorburn	White Leghorns, Australorps, and Rhode Island Reds
G. L. Vogler and M. E. Hooper, Kenmore	Stonehenge	White Leghorns and Australorps
W. Warren, Progress street, Tingalpa	..	White Leghorns and Australorps
N. J. Watson, Lister street, Sunnybank	Glencoe	Australorps and White Leghorns
Mrs. V. M. White, Archerfield road, Darra	Viola	White Leghorns and Australorps
P. A. Willson, Board street, Deagon	Myara	White Leghorns and Australorps
G. A. C. Weaver, Herberton road, Atherton	Weaver's	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams
F. H. J. Weeks, Bajool	Glen Brae	White Leghorns and Australorps
Miss I. G. Winter, 761 Ruthven street, Toowoomba	..	White Leghorns
Miss L. M. Wooller, Huet street, Rockhampton	Riverview	Rhode Island Reds, White Leghorns, and Australorps
P. A. Wright, Laidley	Chillowdeane	White and Brown Leghorns and Australorps
A. Wruck, Main road, Upper Brookfield	Wrucks	White Leghorns and Australorps

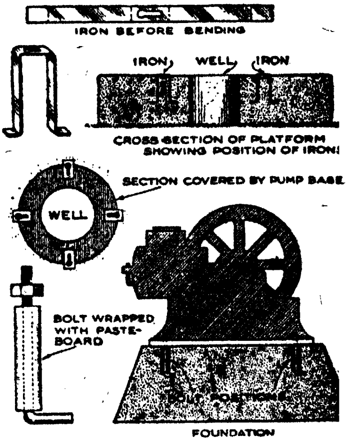
AFFIXING FARM MACHINERY TO CONCRETE BASES.

This makes removal for repairs, etc., easy, whilst two ways are shown for setting bolts into concrete foundations, the upper method being particularly adaptable to pumps.

Take 4 pieces of flat iron about 18 in. long and bend into U-shape, as shown. Drill holes large enough to permit entrance of bolthead in each piece, and from this hole cut a slot a trifle wider than the shank of the bolt and about 1½ in. long.

Suspend these U-pieces in the mould with slots pointing to the centre in such a position that the centre of the slots will be in line with the holes in the pump base. Make sure these are not moved out of alignment when concrete is placed.

As soon as concrete has set sufficiently to prevent flowing, the bolts are placed in position and worked back and forth in the slots to remove some of the cement and form a cavity for the bolt heads. The one difficulty in setting the bolts is to space them properly so as to enter the holes in the engine base.


IRON BEFORE BENDING
IRON
WELL
IRON
CROSS-SECTION OF PLATFORM SHOWING POSITION OF IRONS
SECTION COVERED BY PUMP BASE
WELL
BOLT WRAPPED WITH PASTE-BOARD
BOLT POSITIONS
FOUNDATION

For the other, take bolts or pieces of ½ in. rod about 12 in. long threaded on one end. Bend the other end 3 in. at right angles.

Suspend bolts from stationary wooden strips laid across form in a position corresponding to holes in engine bed. Before cement is poured in, wrap the shank of the bolts with heavy pasteboard or corrugated cardboard to make cylinders about 1 in. in diameter. After cement has hardened, these cylinders will still be soft from moisture absorbed and can be easily removed, leaving holes in the base that permit a fair range of movement of bolts.

—*From "Handy Farm and Home Devices and How to Make Them."*
(J. V. Bartlett for War Blinded Association, Adelaide, S.A.), 1946

GENERAL NOTES

Staff Changes and Appointments.

The appointment of Mr. H. K. Lewcock, B.Sc. Agr., M.Sc., as Assistant Director of Marketing and Senior Marketing Officer in the Department of Agriculture and Stock has been confirmed.

Mr. G. D. Daly, Assistant Bacteriologist, will be transferred from the Animal Health Station, Oonoonba, to the Animal Health Station, Yeerongpilly.

Mr. O. St. J. Kent, B.Sc., A.A.C.I., Senior Dairy Technologist in the Division of Dairying, Department of Agriculture and Stock, has tendered his resignation on acceptance of an appointment as Chief Dairy Research Officer and Principal of the School of Dairy Technology, Department of Agriculture, Victoria.

Mr. L. E. Nichols, B.Sc.Agr., Dairy Technologist, Toowoomba, has been appointed Acting Assistant Director and Senior Dairy Technologist, Division of Dairying, Department of Agriculture and Stock.

Two growers' representatives on the Banana Industry Protection Board are appointed annually, and Messrs. W. A. H. Cheales (Gympie) and V. G. Tredwell (Currumbin) have been appointed as representatives on the Board until the 30th September, 1947. The Government representatives are Dr. W. A. T. Summerville (Director of Horticulture) (chairman), and Mr. J. H. Simmonds (Officer in Charge, Science Branch).

Special leave of absence has been granted to Mr. A. K. Sutherland, B.V.Sc. (Syd.), Government Veterinary Officer stationed at the Animal Health Station, Yeerongpilly, to enable him to accept a graduate assistantship at the College of Veterinary Science at Illinois, U.S.A., for a period of one year. At the expiration of this period, Mr. Sutherland will return to the Department of Agriculture and Stock, and the knowledge and experience in veterinary laboratory work gained in the U.S.A. should prove of considerable benefit to Queensland stockowners.

Milk Board.

Regulations under *The Milk Supply Act of* 1938 have been amended to provide that straight-out voting shall be employed in future elections of members of the Milk Board, instead of optional preferential voting as at present in force.

Northern Pig Board.

An Order in Council has been issued under *The Primary Producers' Organization and Marketing Acts* giving notice of intention to extend the operations of the Northern Pig Board for a further period of three years from 1st January, 1947. A petition for a poll to decide whether the Board's operations shall be continued may be lodged on or before 18th November.

Egg Board Boundaries.

A petition was received recently from egg producers requesting the issue of an Order in Council to extend the present boundaries of the Queensland Egg Board. Accordingly, a notice of intention to make such an Order in Council under *The Primary Producers' Organization and Marketing Acts* received the approval of the Executive Council. Growers of eggs in the area concerned may lodge a petition to decide whether the Order in Council shall be made, such petition to reach the Minister for Agriculture and Stock on or before 18th November.

If the proposed additional area is placed under the control of the Board, its territory will embrace the whole of the area under Commonwealth wartime control, with the exception of the shires of Eidsvold and Monto. The Commonwealth proposes to terminate its wartime control of eggs at the end of December.

Wild Life Preservation.

By an Order in Council under *The Fauna Protection Act of* 1937, the camping and water reserve R.11, on "Booralie," Bowen, the property of Mr. G. H. Kelsey, has been declared a sanctuary for the protection of fauna.

Drought Relief.

The Minister for Agriculture and Stock (Hon. H. H. Collins) has announced that cheques to the value of approximately £50,000 had been sent to dairy farmers who had suffered hardships, because of the dry conditions which prevailed in some dairying areas during the year 1944-45, and had applied for assistance. This money, which is an outright grant, was provided in equal proportions by the Commonwealth and this State.

Stock Food Standards—A Warning.

The Minister for Agriculture and Stock, Mr. H. H. Collins, stated recently that many complaints were being received by his Department from farmers in dry areas about the adulteration of hay and chaff sold to them. All people who are concerned with the growing, baling, chaffing, or sale of hay and chaff are warned that it is an offence under The Stock Foods Acts to sell any of these materials containing any substance harmful to animals or which has been added for the purpose of fraudulently increasing the weight; and such material may contain not more than 5 per cent. by weight of any foreign substance even if it is not harmful to animals.

Southern Cane Growers' Executive.

Following the closure of Eagleby sugar mill, near Beenleigh, an Order in Council has been issued under the *Primary Producers' Organization and Marketing Acts* providing for altered representation on the Southern District Cane Growers' Executive. Instead of one representative each of suppliers to the Eagleby and Rocky Point mills and three to the Moreton central mill on the Executive, there will now be two representatives of suppliers to Rocky Point mill and three to the Moreton mill. A further Order in Council alters the list of mill suppliers' committees appearing in subsection (4) of section 30 of the abovementioned Acts by deleting the name of Eagleby mill.

Proposed Central Queensland Egg Board.

The Executive Council has approved of the issue of a notice of intention to make an Order in Council under the *Primary Producers' Organization and Marketing Acts* constituting a Central Queensland Egg Board.

The proposed Marketing Board shall consist of four elected representatives of the producers of eggs and the Director of Marketing . Such representatives shall be elected triennially and shall hold office for three years. One representative shall be elected for each of the following districts:—

District No. 1.—The town of Gladstone and the shires of Monto, Miriam Vale and Calliope.

District No. 2.—The shires of Mount Morgan and Banana, the Theodore Irrigation Area, the shires of Bauhinia, Duaringa, Emerald and Peak Downs, and that portion of the shire of Belyando which is east of the Drummond Range.

District No. 3.—The city of Rockhampton and the shires of Fitzroy and Livingstone.

District No. 4.—The city of Mackay and the shires of Broadsound, Sarina, Mirani, Pioneer and Proserpine.

Tanning Hides and Skins.

The answers to many inquiries will be found in a new booklet entitled *Tanning Hides and Skins,* which is now available. Its contents include the preparation of white hide for leg ropes, information on the chrome leather process, the making of sheepskin mats and rugs, methods of tanning marsupial and other skins, waterproofing coats and home-made oilskins and tarpaulins and ways of preparing greenhide. This useful little handbook is published by the Farmers and Settlers Newspaper Proprietary, Sydney. Our copy is from Edwards, Dunlop & Co., Edward street, Brisbane, from whom copies may be obtained (price, 1s. 6d.; postage, 2d. extra).

Rural Topics

Another Big Shearing Tally.

M. Fisher of Augathella shore 315 ewes and lambs in 7 hours 45 minutes at Bunda Bunda Station, North-west Queensland, on October 2nd, using four combs and nine cutters. Probably he would have put up a record had he not lost 15 minutes. Fisher's tallies for eleven days, when rain stopped work, were 241, 261, 315, 236, 231, 259, 249, 217, 209, 249, and 217.—C. Frewen in the *Courier-Mail* (Brisbane).

Thus a *Courier-Mail* commentator:—

This report of the shearing tally of 315 sheep in 7 hours 45 minutes, put up by Mick Fisher, of Augathella, has set chins wagging among old-time shearers in Brisbane. They gave the palm to Jack Howe, whose name perpetuated the "Jackie Howe singlet." In eight hours, one day in October, 1892, he shore 321 sheep with blades at Alice Downs Station.

Although they had no definite records to back up their statements, they said Howe's record had been exceeded only once by a shearer in West Australia, who had tallied 326 in a day.

Among the mighty shearers of modern times—since the advent of the machine—they numbered Sandy Urquhart, who shore 310 in a day at Newstead Station, Ilfracombe. Tony Ogden had tallied 315 at Leichhardt Farms Station, near Aramac. Howe, Ogden, and Urquhart's records, they said, were more notable in that they gained them shearing full-wool sheep carrying fleece of at least 12 months' growth. These are the hardest sheep to shear.

George Pont, father of the A.W.U. district secretary of that name at Longreach, established a record in 1936, when, at the age of 68, he shore with hand blades enough stud rams to average him a wage of more than £4 a day. His average was produced at Terrick Terrick Station, near Blackall, after a run of several weeks, and meant that he tallied near the 200 mark.

Comparable with Pont's performance was that of Ted Dean, who, two years ago, averaged 200 a day in an extended run at Hereward Station in the Longreach district. He celebrated his 65th birthday at this shed, and on the day he became eligible to draw old-age pension he tallied 225 sheep.

[In his heyday, Ted Dean was one of the fastest shearers in Australia. An old Westerner, Bob Matthews, has supplied us with authenticated summaries (originals seen) of some of his daily tallies which include the following totals of 200 sheep and over]:—

Terrick Terrick Station, September, 1907—205, 202, 207, 204; October, 1907—218, 236, 274, 210, 226, 235, 201. Lorne Station, November, 1907—222, 216, 211, 211, 202. Mount Morris Station, December, 1907—204, 227, 218. Northampton Downs, April, 1908—203, 203; May, 1908—211. Cambridge Downs, June, 1908—210, 213,; July, 1908—210, 210, 238. Alice Downs, July, 1908—241, 209; August, 1908—274, 237, 223, 217, 261, 260, 283. Terrick Terrick, September, 1908—206, 210, 219, 227, 215, 213, 231, 214, 213, 238, 250, 222. Lorne, October, 1908—219, 229, 232, 225, 233; November, 1908—220, 206. Mount Morris, November, 1908—206, 206, 206; December, 1908—200.

Ted Dean's average for three sheds—Terrick Terrick, Lorne, and Mount Morris—in the 1907 season was 153; highest daily tally, 274. For the six sheds—Northampton Downs, Cambridge Downs, Alice Downs, Terrick Terrick, Lorne, and Mount Morries—in the 1908 season his average was 163; highest daily tally, 283; highest weekly tally, 221; days worked, including wet weather, 136.—Editor, Q.A.J.]

Bob Matthews (Hawthorne, Brisbane) writes: "Ted Dean's 283 in 1908 was the best tally cut since Jack Howe's day—321, when the average weight of the Australian fleece was only 3 lb. 8oz., bare bellies and clean points, compared with the 7 lb. fleece of 1908. Jack Howe, with blades; Ted Dean, machine. On the day Ted Dean shore 274 at Terrick Terrick (11th October, 1907) I had the assurance of the shed overseer and bookkeeper at the time (Messrs. Jobson and O'Reilly) that on one run he shore 7 sheep in 9 minutes."

Shearing Records of Yester-year.

Subjoined is a reprint of an interesting clipping from the *North Queensland Register* of about 28th October, 1908:—

"Mr. J. Leahy, General Secretary of the Machine Shearer's and Shed Employees' Union, writing in the *Pastoralists' Review* of the 15th instant, (15-10-1908) says:—

"In last month's issue, page 586, I noticed an article headed 'A wonderful Shearing Record,' the same being a record of portion of the sheep shorn at Murnpeowie Station, South Australia, by one of the teams of the Federal Sheep-Shearing Company, wherein it is claimed that, using Moffat-Virtue machines, this station put up a record for Australia. Such is not the case. The best average for a big team of shearers in Australia in the last sixteen years was put up at Alice Downs Station, Blackall, Queensland, this year by one of my teams using Wolseley machines.

"I have carefully noted the tallies of the Murnpeowie team and am herewith enclosing a copy of the tallies of the Alice Downs team for four days. You will note that there is a difference in the average of the two teams from drummer to ringer. The sheep at Alice Downs were shorn in a most satisfactory manner, the owner being greatly pleased with the way in which the sheep were put through, and on the completion of the shearing he complimented the overseer on the way he had conducted the shearing.

"You will also note that I am giving you the time worked each day, and if you wish to verify these tallies you can inspect the tally book, the tally sheet, and the ledger. I think after inspection you will agree that there is no comparison at all between the two teams. I am quite prepared to give you the results from the date of starting to the date of finishing, and I think that, on seeing the same, you would be greatly surprised.

"The daily tallies were:—

	10th August.	11th August.	12th August.	13th August.
W. F. Smith	126	140	136	128
C. Pugh	152	181	173	183
D. Patterson	169	196	204	190
Mart. Murphy ..	178	200	205	195
N. Brown	140	151	184	174
J. Phillips	143	161	170	172
W. H. Garvie	149	171	228	206
H. A. West	153	177	225	202
E. R. Webber	152	144	181	167
O. Harrison	204	240	239	248
H. A. Marsh	209	238	234	256
D. O'Malley	182	208	212	206
J. Matthews	127	135	152	152
R. Matthews	267	111	138	147
W. Spence	140	164	165	163
Mick Murphy	174	213	207	207
G. Bennett	183	—	—	—
E. R. White	174	225	219	226
W. Patterson	155	167	165	168
E. Broomfield	156	177	167	153
T. Case	136	148	148	150
Joe O'Malley	138	145	133	102
E. Harrison	164	205	193	218
J. Boyland	176	200	201	217
C. Maude	188	225	214	224
E. Dean	217	261	260	283
H. Lane	180	213	217	233
E. L. Fern	187	197	201	213
Totals	4,719	5,003	5,171	5,183

The number of shearers employed was—for one day, 28; for the following three days, 27. Allowing twenty-eight men for each day, the average works out at 184¼ per man. The average of my ringer (E. Dean) is 255 as against 241 cut by Day.

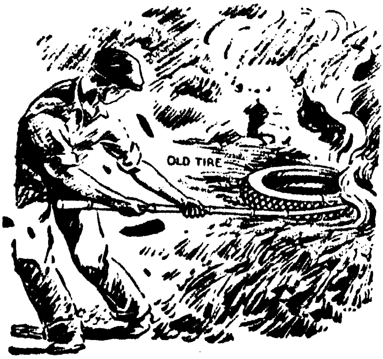
"The time worked and the average per man per day were:—

	hrs.	mins	Average.
10th August	8	20	168
11th August	8	25	185
12th August	8	25	191
18th August	8	25	191"

GADGETS AND WRINKLES

A USEFUL SMOTHER FOR GRASS FIRES.

This is another quite useful idea for extinguishing a grass fire as it has been used with success by one farmer, and in districts where grass fires are likely, it is well worth while keeping a few old tyres handy for use as suggested, as grass fires can be fairly quickly extinguished by dragging the tyres over the grass as shown here.



The tyre is wired to the end of a light pole and it is pulled over the burning grass as indicated.

It is quite effective and there is very little danger of the rubber igniting, if the tyre is moved fairly rapidly, which would of course also be better in order to put the fire out.

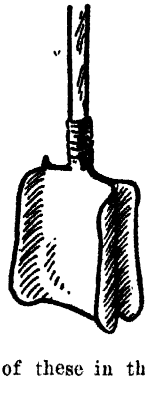
A USEFUL FIRE BEATER.

This handy tool or "fire flap" is a most useful one for extinguishing grass fires. It is far more efficient than the usual twig as it does not spread the sparks but stifles the flames, and the rubber does not catch fire.

As seen in the sketch, two rubber flaps are cut from old 6 in. motor inner tubes; each flap should be, if possible, 14 to 15 in. square, with an extra length in the middle of each flap of about 3 in. wide and 4 in. long.

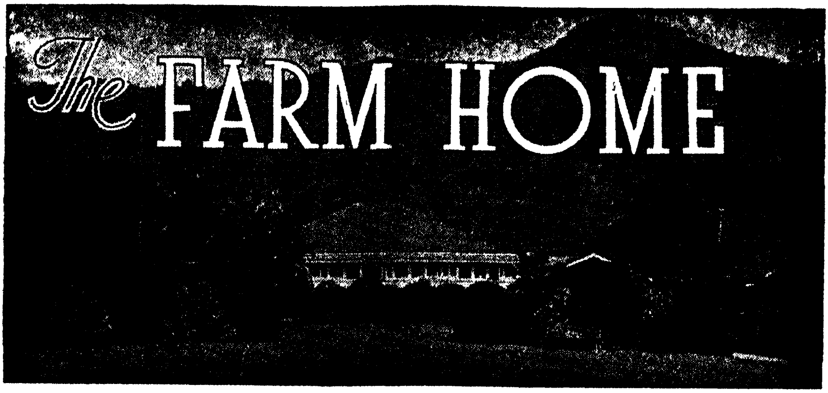
The flaps are laid one on top of the other, the extra centre bit is folded round a wooden handle of 4 to 5 ft. in length. Broomsticks might be used but a little longer handle is preferable.

The centre piece of the flaps are firmly nailed to the handle then bound with wire and the wire is then covered by rubber binding.



One user of this type of fire-flap has used them periodically for several years with much success. It might therefore be advisable for any who live in fire danger areas to make several of these in their spare time to have handy in case of need.

The items on this page have been extracted from "Handy Farm and Home Devices and How to Make Them," a recent notable work by J. V. Bartlett, published in Adelaide on behalf of the War Blinded Association.



Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

" THE BABY WHO CRIES TOO MUCH."

ONE of the more common problems a mother has to deal with is her baby's crying. This often worries a mother with a first baby because she has not learnt all the reason why babies cry and when she has just arrived home from hospital with her very new baby and he starts to yell lustily she is upset and anxious.

The first thing mothers have to realize is that all young babies cry at times because it is their only way of expressing themselves, but if a baby cries unduly there may be something wrong and the cause must be sought.

Do not imagine that every time a bay cries he is hungry—if he is fed at regular intervals, is gaining sufficient weight, he is not likely to cry from hunger except perhaps just when his feed is due. But if he is not gaining enough weight he may be hungry, and the sister at the welfare centre will arrange some test feeds for him.

There are lots of other causes for crying besides hunger. Baby may be thirsty in hot weather in which case a drink of boiled water will put a stop to his crying, or he may be uncomfortable from tight or wet clothing, or he may be dressed too warmly or not warmly enough, or he may be sleepy or overtired. The mother should be on the look-out for these causes and correct them if they occur. Babies seem to cry a little more when they are first home from hospital, perhaps because the surroundings are strange and the mother may not handle a babe quite as securely and expertly as the nurses. But this problem should soon be overcome as long as the mother does not worry about it. If she loves her baby and is interested in doing the right thing she will quickly learn to keep calm and to handle the baby firmly.

When the baby's napkin has been changed and it is seen that he is comfortable and there is nothing wrong with him, he should then be left alone.

He must not be picked up constantly, rocked, or walked, to make him stop crying, or he will become a spoilt little tyrant in no time. An occasional good cry will not hurt the baby or cause a rupture, as mothers are sometimes told by misguided neighbours.

Nevertheless, there is nothing more upsetting to parents than a constantly crying baby, and a mother needs someone who is very experienced in the care of babies to turn to when her baby appears to be crying too much.

If she has tried all the usual measures without success, she should see her doctor or take her baby along to her welfare centre, and have the matter thoroughly investigated.

Any further information may be obtained by communicating personally with the *Maternal & Child Welfare Information Bureau*, 184 *St. Paul's Terrace, Brisbane*, or by addressing letters *Baby Clinic, Brisbane*. These letters need not be stamped.

IN THE FARM KITCHEN.

Dishes from Cold Meat.

Hot Pot.

Take any left-over cold meat, cut small or mince, put in a piedish with 1 or 2 sliced onions, and carrot if liked. Pour over 3 tablespoons flour mixed with about 1½ cups or more of water and 2 or 3 tablespoons tomato sauce and hot sauce. Put lid on dish and bake two hours or longer. Serve hot, with mashed potatoes.

Making Cold Corned Beef Tasty.

Cut the beef in rather thick slices, dip in batter and fry in the usual way. Serve with apple sauce. Use a good nut of butter to two good-sized apples and no water; if the meat is very salty, sweeten the sauce.

Beef Mould.

Take 1 lb. cold roast beef and 2 oz. bacon and ham and mince them. Fry 1 chopped onion in a little butter and add minced meat to pan. Heat well, adding 1 gill of stock or gravy, 4 oz. breadcrumbs, 1 tablespoon of chopped parsley, a pinch or two of dried herbs, 1 beaten egg and a seasoning of salt and pepper. Butter a mould, which should be sprinkled with breadcrumbs before adding mixture. Bake same, covered with a greased paper, for three-quarters of an hour.

Curry.

Required: 1 lb. of any kind of cold meat, ½ pint of stock made from the bones, 1 level tablespoon of curry powder, 1 dessertspoon of chutney, 2 small onions, 2 medium-sized cooking apples, 1 oz. of dripping, salt. Peel and core the apples, peel the onions, and chop rather small. Melt the fat in a pan, put in the onions, the meat and apples, cut in cubes, sprinkle with the curry powder and a little salt, and fry until they are nicely browned. Add the stock, stir for a few minutes, then turn the whole into a casserole with the chutney, and cook gently in a moderate oven for 1½ hours.

Meat in Sauce.

Peel and fry one or two onions, cut in quarters, and when just coloured sprinkle in 1 oz. of flour. Let it all cook a minute or so before adding a cup of stock—either meat or vegetable—or failing that, meat extract and water, a pinch of powdered herbs, a little vinegar, a seasoning of salt and pepper, and two tomatoes. Let it all boil gently till the vegetables are quite tender, then pass through a gravy strainer. Trim some slices of cold meat, lay them in the sauce, and heat up gently. When half done, add a little pickle. Serve with mashed potatoes.

Meat Patties.

Scraps of cold meat, 1 teaspoon minced onion, 1 teaspoon minced parsley, cold mashed potatoes, 1 tablespoon of gravy, ½ oz. butter. Mince the meat very finely and mix with the rest of the ingredients except the butter and potatoes. Put into well-greased patty tins, cover with mashed potatoes dotted with small lumps of butter, and bake until brown.

Scotch Collops.

Mince the meat with a little fat. To ½ lb. minced meat, allow ½ teacup breadcrumbs, ½ cup stock, 1 onion, 1 dessertspoon dripping, a few drops of sauce or ketchup, pepper, salt, and a dash of grated nutmeg. Melt the dripping in a pan, and when it is smoking hot put in the minced meat and the onion finely chopped. Pound these with a wooden spoon until the meat is nicely browned. Pour in the stock or add a meat cube dissolved in a little water. Season, put on the lid and simmer slowly for half an hour. Then add the breadcrumbs, which will absorb any liquid fat, and cook a few minutes longer. Garnish with small pieces of toast and serve with baked tomatoes.

Carne Pie.

A quarter of a pound boiled macaroni, 1 breakfastcup of minced cooked meat, ½ lb. tomatoes peeled and sliced, 1 teacup of brown breadcrumbs, 1 onion, 1 oz. butter, pepper and salt. Arrange the macaroni, tomato, meat, onion and seasoning in layers in a well-greased piedish, placing the breadcrumbs and dabs of butter on top. Bake from half to three-quarters of an hour.

Kentish Steak.

Put cold roast beef or mutton through mincer with celery and some parsley. To 3 cups of meat add 1 cup of breadcrumbs, 3 dessertspoons softened dripping, a small onion (minced), pepper and salt. Sprinkle with flour, mix all ingredients with beaten egg and bake about 20 minutes, basting two or three times with hot vinegar and dripping. Spread a layer of crumbs and one beaten egg over the top, return to oven to brown, and serve with potato chips and peas.

Vegetables on the Menu.

Vegetable Charlotte.

Two eggs, 1 cup stock, 1 tablespoon butter, seasoning, breadcrumbs, 3 tablespoons grated cheese, 4 cups mashed cooked vegetables (carrots, potatoes, beans, peas and onion). Mix stock and vegetables smoothly, add beaten egg yolks, cheese and seasoning. Whip egg whites stiffly, fold into mixture, pour into fireproof dish and cover with crumbs. Dot with butter and bake 40 minutes in moderate oven.

Potatoes in White Sauce.

Potatoes browned in the oven in a white sauce are excellent with fish. For two very large potatoes, make ½ pint of sauce. Cut the potatoes in dice and put them in a buttered baking dish with layers of the sauce. Scatter with breadcrumbs and brown in the oven or under the grill. Make the white sauce by blending a tablespoon of margarine and flour, add half a cupful of milk, stir until smooth, and season with salt and pepper.

Baked Carrots.

Three cups grated carrots, 3 tablespoons butter, salt and pepper. Place grated raw carrots in baking dish with tight cover. Bake in a moderate (350 deg. F.) oven for half an hour. Just before serving sprinkle with salt and pepper and dot with butter. Carrots baked in this way have an extraordinarily rich, sweet flavour. A sprinkling of ginger may be added to carrots before putting in oven for added flavour. Whole carrots, firm and of fair size, may be baked carefully in the oven, and they offer a similarly sweet flavour. Wash and clean carrots and bake in skin. When cooked, cut in half lengthwise and add butter and seasonings.

Cooking Dried Peas.

Dried peas, when nicely mashed, are tempting in appearance, as their soft green colour contrasts so well with whatever they are served. For instance, a dish of cutlets piled against a mound of mashed potatoes, with little heaps of mashed peas, arranged as a border, and a touch or two of thick tomato sauce, not only makes a nice scheme of colour for a one-dish course, but is as good as it looks. Sausages can be substituted for the cutlets. To cook the peas they should be soaked over-night with a little bi-carbonate of soda, then well boiled, passed through a coarse sieve, and mashed with butter and milk (or bacon fat), and seasoned to taste.

Beetroot Mould.

Ingredients: 2 dessertspoons (½ oz. gelatine, 2 average-sized beets (cooked), 1 cup (½ pint) hot water, ¾ cup vinegar, pepper, salt, sugar to taste.

Method: Peel and slice beetroot. Dissolve gelatine in hot water. Add sugar, salt, pepper and vinegar. Leave to thicken slightly, then pour over the beetroot. Serve garnished with shredded lettuce and slices of tomato. Serve with mayonnaise dressing. If liked, more vinegar and less water in proportion may be used in this recipe. If setting in an ice-chest or refrigerator, use less gelatine—1¾ dessertspoons.

Pumpkin Fritters.

Take one teacup mashed (boiled) pumpkin made into a stiff batter with flour; add one teaspoon baking powder, a pinch of salt; a pinch of ground cinnamon, half a teacup sugar, 2 well-beaten eggs, and sufficient milk to make batter the consistency of dropscones. Have a frying-pan ready with hot fat, then drop batter by tablespoon into frying-pan. Fry a nice brown. When done serve hot, and sprinkle sugar and ground cinnamon over them.

Cauliflower Fritters.

Break off the sprays of a cooked cauliflower, season each with salt and pepper, dip in frying batter, and fry in deep fat. Drain well and serve piled on a hot dish. Garnish with fried parsley.

Cabbage with Sour Sauce.

Take one small head cabbage, 2 tablespoons sugar, 3 or 4 tablespoons vinegar, 2 tablespoons butter, 1 cup thick cream, 1 egg. Cut cabbage into eighths, then soak in cold water. Boil in salted water for 20 minutes. Put the butter into a saucepan with the vinegar, mix and add sugar. Stir constantly over the fire until it reaches boiling point, then stir in the egg, well beaten, also cream. Heat well over fire, then pour sauce over the cabbage and serve.

QUEENSLAND WEATHER FOR OCTOBER.

Aggregate district rainfalls were below normal throughout the State, though scattered thunderstorms of variable amounts fell in the south-eastern districts, mainly between the 6th/7th, 16th, and 26th to 28th. These storms were reasonably well distributed in the eastern fringe of the Downs and the Moreton-Sub-division, which showed the smallest rainfall deficiencies of 35 per cent. and 16 per cent. respectively. Most of the useful rain benefit of September was also confined to these restricted areas, and the recurring scattered storms of October should maintain the previous recovery. In the Port Curtis Section, 27 per cent. below normal, approximately a quarter of the stations reported over 2 to 2½-inch totals, but further seasonal storms are urgently required to rehabilitate most of that district. In the Central Coast East, Central Highlands, Atherton Plateau, and Upper Carpentaria there were isolated storms, but for the *seventh successive month* many districts throughout the State, apart from the south-easern corner, reported either no rain or a few points. The exceptionally dry weather along the tropical coast areas was reflected in a rather unusual record of winter and spring bush fires north to the Peninsula. Apart from the previously mentioned improved farming prospects in limited areas in the south-eastern corner, rising seasonal temperatures are now contributing to the already protracted harsh seasonal conditions. All the main pastoral districts, inland and coastal, need a series of seasonal November storms to start and maintain growth and provide surface water.

Pressure.—Inland trough and southern low-pressure distribution was advancing through South Australia on the 3rd. The through and associated cold front produced the convergence thunderstorms in the south-east 5th/7th, but general movement was too rapid for inland rains. Another marked inland trough on the 13th commenced its eastward movement, followed by a vigorous cold southerly front. Local thunderstorms conditions extended along a line from the north-west of the State to the Warrego on the 14th, but again rapid movement detracted from rain production, and by the 15th the new continental high was bringing moderate south-easterly coastal weather. A moderate northerly circulation persisted on the Central and South Coast preceding these trough movements, the last of which brought the South Coast storms of the 26th/27th. Although pressure distribution showed the seasonal influence of lower pressure shallow dip formations in Northern Australia, the absence of an inflow of tropical air from the north and north-west was an unfavourable factor for rain production.

Temperature.—Average maximum temperatures mostly approximated 1 to 3 degrees below normal up to 5.6 degrees at Stanthorpe, where the average minimum readings were also 8.5 degrees below normal.

Local frosts occurred on the Downs 1st/3rd, 17th/18th, 25th/27th; Stanthorpe seven nights (29 degrees/25 degrees on 27th).

A few daily maximum readings over 100 degrees at western stations; Boulia 102 degrees (13th). Considerable haze at times 2nd to 4th and 5th, and in western and tropical sections 6th/7th; also 13th/15th, 17th/18th, 21st/22nd; latter periods accompanied by squally northerly winds with west to south-west change.

Brisbane.—Pressure $\frac{9 + 3}{2}$ 30.050 (normal 30.038). Temperatures.—Mean maximum, 76.4 degrees (normal, 75.5 degrees); mean minimum, 58.2 degrees (normal, 60.1 degrees); mean temperature, 67.3 degrees (normal, 69.7 degrees); lowest since October, 1939. Highest daily, 86.0 degrees (2nd and 29th); lowest daily, 48.8 (17th). Rain—251 points, 7 days (average, 259 points on 9 days).

Rain position is summarised below:—

Division.	Normal Mean.	Mean Oct. 1946.	Departure from Normal.	Progressive Totals, May to end of October.	
				Normal.	1946.
	Points.	Points.	Per cent.	Points.	Points.
Peninsula North	45	19	58 below	315	202
Peninsula South	70	1	99 ,,	220	12
Lower Carpentaria	52	2	96 ,,	188	5
Upper Carpentaria	76	18	76 ,,	320	19
North Coast Barron	133	35	74 ,,	958	438
North Coast Herbert	178	29	83 ,,	1398	347
Central Coast East	129	53	59 ,,	787	128
Central Coast West	77	0	100 ,,	473	18
Central Highlands	146	36	75 ,,	734	113
Central Lowlands	98	8	91 ,,	497	25
Upper Western	60	2	97 ,,	264	4
Lower Western	71	0	100 ,,	340	3
South Coast Port Curtis	208	151	27 ,,	1099	370
South Coast Moreton	274	231	16 ,,	1522	668
Darling Downs East	223	146	35 ,,	1041	604
Darling Downs West	165	19	88 ,,	800	314
Maranoa	161	34	79 ,,	812	173
Warrego	110	12	89 ,,	626	126
Far South-west	86	0	100 ,,	458	38

Commonwealth of Australia Meteorological Bureau, Brisbane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

OCTOBER RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.	No. of years' records.	Oct., 1945.	Oct., 1946.
North Coast.	In.		In.	In.
Atherton	0·90	42	1·23	1·26
Cairns	2·06	61	0·74	0·12
Cardwell	1·95	71	1·90	0·63
Cooktown	1·00	67	0·56	Nil
Herberton	0·93	57	1·08	0·93
Ingham	1·80	51	2·82	0·38
Innisfail	3·12	62	5·30	0·37
Mossman	2·59	19	3·58	0·69
Townsville	1·25	72	0·85	0·06
Central Coast.				
Ayr	0·87	56	1·84	0·06
Bowen	0·97	72	1·11	0·09
Charters Towers	0·71	61	2·70	Nil
Mackay	1·76	72	5·10	0·38
Proserpine	1·53	40	3·39	0·31
St. Lawrence	1·76	72	3·99	0·33
South Coast.				
Biggenden	2·49	44	4·48	2·28
Bundaberg	2·07	60	1·99	2·13
Brisbane Bureau	2·59	94	2·73	2·51
Caboolture	2·73	67	3·27	3·28
Childers	2·71	48	3·03	1·25
Crohamhurst	3·38	50	2·67	5·33
Esk	2·60	56	1·62	1·92
South Coast—cont'd.	In.		In.	In.
Gatton College	2·06	44	5·54	..
Gayndah	2·37	72	3·07	1·78
Gympie	2·73	73	2·70	2·62
Kilkivan	2·68	62	1·31	2·01
Maryborough	2·73	72	2·04	1·23
Nambour	3·23	47	3·89	3·46
Nanango	2·19	61	1·93	1·80
Rockhampton	1·78	72	2·34	1·80
Woodford	2·53	55	1·56	3·51
Darling Downs.				
Dalby	2·01	78	0·61	0·32
Emu Vale	2·18	47	0·95	1·75
Jimbour	1·88	64	1·45	0·55
Miles	2·00	58	0·40	0·61
Stanthorpe	2·50	70	1·18	2·11
Toowoomba	2·54	71	1·74	2·17
Warwick	2·32	78	0·59	2·02
Maranoa.				
Roma	1·73	69	0·76	0·87
St. George	1·29	62	0·35	0·09
Central Highlands.				
Clermont	1·28	72	2·45	0·23
Springsure	1·62	74	4·08	0·07

CLIMATOLOGICAL TABLE FOR OCTOBER.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	84	66	87	16	57	3	17	8
Herberton	..	80	55	88	6, 7	41	1	93	4
Townsville	..	84	66	94	4	56	18	6	1
Rockhampton	30·07	84	60	92	24	50	18	180	4
Brisbane	30·10	76	58	86	2, 29	49	17	251	7
Darling Downs.									
Dalby	..	81	52	90	13	38	17	32	3
Stanthorpe	..	73	45	84	12	29	27	211	6
Toowoomba	..	73	47	83	23	37	1, 27	217	5
Mid-Interior.									
Georgetown	29·98	95	62	98	31	52	6, 7	Nil	..
Longreach	30·05	88	61	100	14	49	1, 17	22	1
Mitchell	30·02	85	48	93	5, 12, 13, 14	35	1, 2	8	1
Western.									
Burketown	..	93	65	100	25	53	20	Nil	..
Boulia	29·97	90	58	102	13	48	17	Nil	..
Thargomindah	30·05	85	54	99	12, 21	44	4	Nil	..

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

DECEMBER.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Day.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	4.45	6.28	Cairns	51	6	Longreach	44	26
6	4.46	6.32	Charleville ..	30	24	Quilpie	33	37
11	4.47	6.35	Cloncurry	65	35	Rockhampton ..	19	1
16	4.49	6.38	Cunnamulla ..	27	32	Roma	19	15
21	4.51	6.41	Dirranbandi ..	16	22	Townsville ..	42	8
26	4.54	6.43	Emerald	28	11	Winton	52	29
31	4.56	6.46	Hughenden ..	49	21	Warwick	2	6

TIMES OF MOONRISE AND MOONSET.

At Brisbane.

Day.	Rise.	Set.
	a.m.	
1	10.43	..
		a.m.
2	11.40	12.15
	p.m.	
3	12.38	12.49
4	1.37	1.22
5	2.39	1.57
6	3.44	2.33
7	4.53	3.13
8	6.04	3.58
9	7.16	4.50
10	8.24	5.50
11	9.25	6.55
12	10.18	8.04
13	11.04	9.11
14	11.42	10.16
15	..	11.16
	a.m.	p.m.
16	12.17	12.14
17	12.49	1.09
18	1.19	2.03
19	1.50	2.57
20	2.22	3.51
21	2.56	4.46
22	3.34	5.40
23	4.16	6.34
24	5.02	7.25
25	5.52	8.13
26	6.45	8.58
27	7.41	9.38
28	8.37	10.15
29	9.33	10.50
30	10.29	11.22
31	11.26	11.55

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27 ; Cunnamulla 29 ; Dirranbandi 19 ;
Quilpie 35 ; Roma 17 ; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Day.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	25	14	42	29	17	4	49	33
6	14	23	30	39	5	14	34	44
11	11	29	26	44	0	20	28	52
16	16	20	32	37	8	11	36	42
21	26	12	42	27	17	2	49	30
26	29	11	44	26	19	1	52	29
31	20	19	36	35	11	10	42	40

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS)

Day.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	45	14	61	41	45	26	37	14
3	34	20	54	44	38	29	29	18
5	23	31	46	51	31	36	21	26
7	13	42	39	59	24	44	13	35
9	5	50	35	63	20	49	6	42
11	6	52	36	65	20	50	7	44
13	13	47	39	62	24	47	13	39
15	22	38	46	56	30	41	20	33
17	28	27	50	48	34	33	24	23
19	37	17	55	43	40	27	31	17
21	46	9	61	37	46	23	37	10
23	52	4	66	34	50	20	43	6
25	53	4	67	34	50	20	44	6
27	50	9	64	37	48	23	41	10
29	42	18	58	43	43	28	35	17
31	31	29	52	50	36	35	26	25

Phases of the Moon.—First Quarter, December 2nd, 7.47 a.m. ; Full Moon, December 9th, 3.52 a.m. ; Last Quarter, December 15th, 8.57 p.m. ; New Moon, December 23rd, 11.06 p.m. ; First Quarter, December 31st, 10.23 p.m.

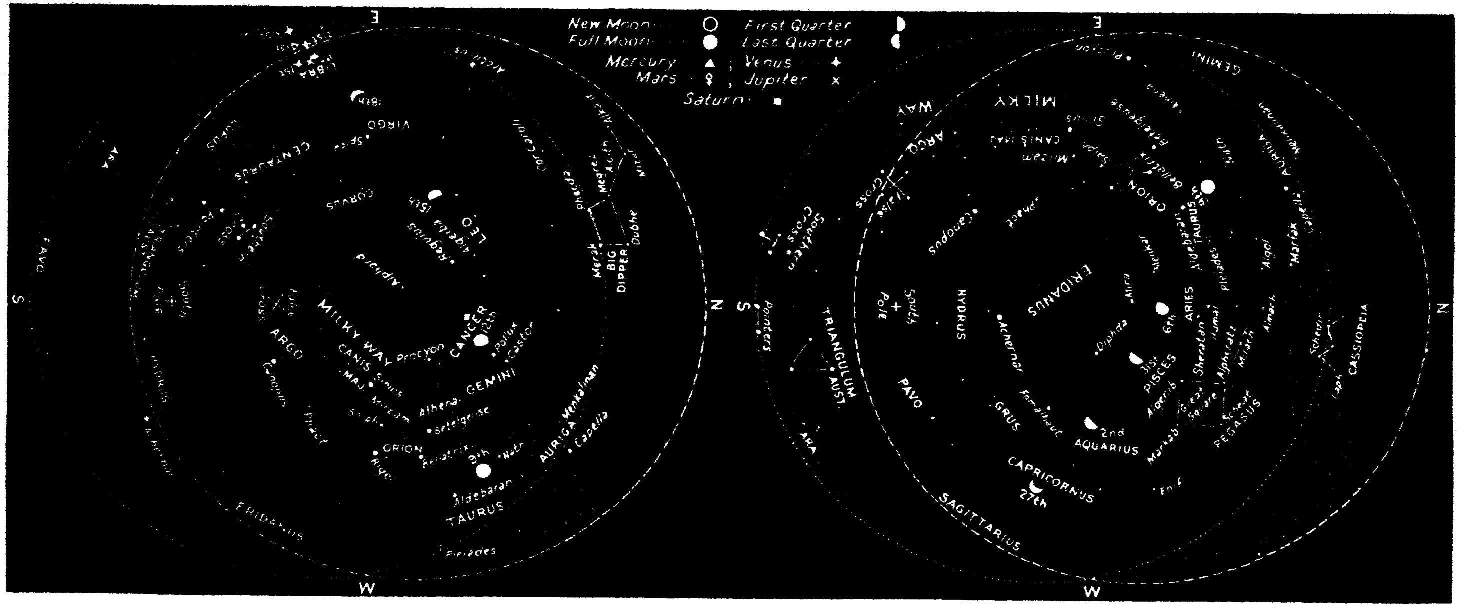
On December 22nd, at 9 p.m., Eastern Australian Standard Time, the Sun will reach its maximum declination south (Southern Solstice). It will then rise and set about 25 degrees south of true east and true west respectively.

On December 4th, 17th, and 30th the Moon will rise and set very close to true east and true west respectively.

Total Eclipse of Moon, December 9th.—At 1.12 a.m., Eastern Australian Standard Time, the Moon will enter the penumbra and at 2.10 a.m. the umbra of the earth's shadow will begin to creep across the disc of the Moon. Totality will begin at 3.19 a.m. and last until 4.17 a.m. Seen from the eastern districts of Queensland, the Moon will set partly eclipsed, but viewed from the far western districts the Moon will have passed out of the umbra before setting.

Mercury.—At the beginning of the month in Libra, will rise about 1 hour before the Sun, and on December 9th will reach greatest elongation west, when it will rise over 1 hour before the Sun. At the end of the month in Sagittarius it will rise 1 hour before sunrise.

Venus.—Will rise about 1 hour before the Sun at the beginning of the month, and will reach greatest brilliancy on December 23rd, when it will rise between 2.30 a.m. and 3.30 a.m. At the end of the month in the constellation of Libra it will rise between 2.15 a.m. and 3.15 a.m.



Mars.—Too close in line with the Sun for observation.

Jupiter.—At the beginning of December, with Mercury and Venus may be seen low in the east during morning twilight, when it will rise between 3.15 a.m. and 4.15 a.m. At the end of the month in the constellation of Libra it will rise between 1.45 a.m. and 2.45 a.m.

Saturn.—In the constellation of Cancer, will rise between 10.30 p.m. and 11.30 p.m. at the beginning of the month and between 8.30 p.m. and 9.30 p.m. at the end of the month.

Star Charts.—The chart on the right is for 8.15 p.m. in the south-east corner of Queensland to 9.15 p.m. along the Northern Territory border on the 15th December. (For every degree of longitude we go west time increases 4 minutes.) The chart on the left is for 7 hours later. On each chart the dashed circle is the horizon at Cape York and the dotted circle is the horizon along the New South Wales border. When facing north hold "N" at the bottom; when facing south hold "S" at the bottom and similarly for the other directions. Only the brightest stars are included and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus, at the beginning of the month the stars will be in the positions shown about 1 hour later than the time stated for the 15th and at the end of the month about 1 hour earlier than that time. The positions of the Moon and planets, which are continually changing in relation to the stars, are shown for certain marked days. When no date is marked the position is for the middle of the month.

NEPTUNE

ORCHARD SPRAYS

Oldest Established and Well Known
on Australian Market

Protect Your Investment
with

NEPTUNE RED SPRAYING OIL

Protect your trees against Red Spider and Scale Insects and tone them for the new season.

NEPTUNE PALSOL

Use for same purpose as Red Spraying Oil; may be combined with Lime Sulphur, Bordeaux.

NEPTUNE CLARIFOL

A dormant or semi-dormant Spray, use in combination with Lime Sulphur, Bordeaux or Black Leaf 40.

NEPTUNE WHITE SPRAYING OIL

For Citrus Fruits, Apples and Pears, Stone Fruit; either straight or in combination with Lead or Black Leaf 40.

Neptune Oil Co. Pty. Ltd.

(INCORPORATED IN NEW SOUTH WALES)

Branches in all States. Agents in all Fruit Growing Areas.

NS 451 B

Volume 63 Part 6

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

DECEMBER, 1946

Issued by Direction of
THE HONOURABLE H. H. COLLINS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

PAGE.

Event and Comment—

Changing Dairy Practices 323
Dairy Production 324

Field Crops—

Peanut-Growing 325
Land Utilization 333
The 1946 Burdekin Flood 336

Vegetable Production—

Cabbage-Growing 341

Answers to Correspondents—

Red Natal Grass 343
"Castor Oil" Plant 343

Plant Production—

Seasonal Notes on the Control of Vegetable Diseases 344
Maori Mite in Midsummer 346
Losses from Water Blister can be Avoided 347

The Dairy Industry—

Queensland Butter Production, 1945-46 349

PAGE.

Animal Health—

Veterinary Medicines 365

Marketing—

The Dairymen's State Council .. 373

General Notes—

Milk and Cream Pasteurization Plants at Warwick and Innisfail 376
The Poultry Advisory Board .. 376
The Navy Bean Board 376
Brisbane Milk Board 376
Sugar Levies 376

Rural Topics—

Market for Dairy Products Assured .. 377
A Farrer Memorial 377

The Farm Home—

How Much Does Your Child Weigh? 378
In the Farm Kitchen 379
Queensland Weather for November .. 380
Rainfall in the Agricultural Districts 381
Climatological Table for November .. 381
Astronomical Data for January .. 382

STATE'S SEEDS ★ ARE GOVERNMENT TESTED ★

SUDAN SEED

Prime, regraded, recleaned. Free Johnson grass and other weeds.

	Lb.
Bag Lots - - - -	**7d.**
Less Bag Lots - - -	**7½d.**

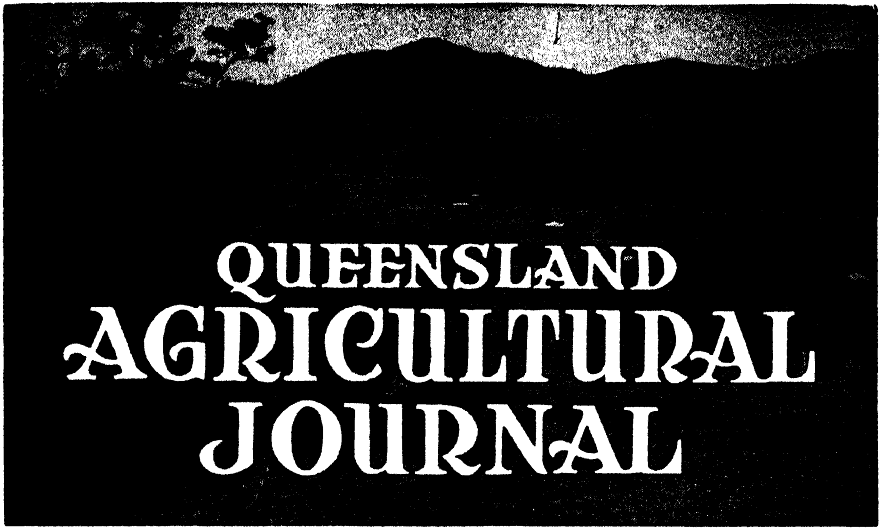
	Bushel s.	d.
Beans—Brown Beautys - -	70	0
Beans—Canadian Wonders -	75	0
	Lb.	
Saccaline—Bag Lots - -		3½
Less than Bag Lots		4
Pumpkins—Beaudesert - -	5	0
Pumpkins—Cattle - - - -	2	6
Rhodes Grass Seed - - -	1	4
Paspalum - - - - - -	1	9

ASK FOR YOUR REQUIREMENTS

STATE PRODUCE AGENCY PTY LTD

**ROMA STREET
BRISBANE**

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, including postage. General Public, **Ten Shillings**, including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Volume 63 1 DECEMBER, 1946 Part 6

Event and Comment.

Changing Dairy Practices.

AS with other primary industries, the dairy industry has had to make adjustments to fit in with changing circumstances. According to Annual Report of Department of Agriculture and Stock, the advisory and extension services of the Division of Dairying have been adapted in accordance with altered practices on dairy farms and in factories.

Machine-milking has increased notably in recent years, stimulus being given by the diminishing labour supply position in rural areas. It is estimated that 30 per cent. of dairy farmers throughout the State now use milking machines, while the percentage is as high as 85 in some specialized dairying districts. Recent investigations have shown that. by a proper appreciation of the essentials of hygiene and mechanical care, milk and cream of the highest quality can be produced by mechanical milking and that productivity and length of lactation of dairy cows are not affected.

Many farmers forced by wartime exigencies to abandon the stripping of cows milked by machines have found that non-stripping does not affect milk yields or animal health, while it minimizes labour requirements in the shed. Although largely a wartime expedient, it is believed the non-stripping technique will increase in popularity. For success, the milking machine must be in good mechanical condition and efficiently operated.

A service has been inaugurated to assist dairy farmers with the mechanical and sanitary care of farm dairy machinery, especially milking machines and separators. Field days have been organized in many centres in co-operation with branches of the Queensland Dairymen's Organization. Visits were also made to farms for the purpose of checking plants and remedying any defects. At these demonstrations particular attention was given to pulsators, vacuum gauges, speeds of plants, air leaks, rubber inflations of milking machines, and the foundation, level setting, height of bowl, discs and speed of separators, as well as operational care and cleansing procedure.

Field officers in dairying districts where a large proportion of farms is equipped with milking machines have now been provided with vacuum gauges and are in a position to offer sound advice to producers on the care and operation of milking machines and separators.

Coupled with machine-milking and the increasing installation of steam sterilizers for dairying purposes, a milking shed has been specially designed with a view to permitting all operations, including the storage of milk and cream, to be conducted in a single building, which affords greater convenience than by dividing the dairy-shed operations among different buildings. With the easing of the supplies of timber and building materials and manpower, numbers of new sheds, designed according to the modified plan, have been constructed. This shed design will also facilitate the cooling of milk and cream, a matter of great importance in the improvement of the quality of dairy produce.

The use of electricity for motive power for the milking machine and the heating of water for use in dairy sheds, although a recent innovation in most dairying districts, is spreading as rapidly as installations become available.

Dairy Production.

THE butter output for the year was 101,242,498 lb., compared with 95,005,539 lb. in the previous year; its estimated value was £7,493,436, as against £6,498,289 in 1944-45. Grading results were:—Choice, 549,357 boxes (36·86 per cent.); first, 835,026 boxes (56·03 per cent.); second, 92,439 boxes (6·21 per cent.); and pastry, 13,463 boxes (1·09 per cent.).

Cheese production amounted to 26,943,245 lb., valued at approximately £1,362,619, as compared with 23,001,555 lb. and £1,109,975 in 1944-45, respectively. Cheese graded officially by Commonwealth and State officers totalled 18,308,511 lb. Results were:—Choice and first grade, 12,863,746 lb.; second, 5,176,916 lb.; third, 267,849 lb.

Despite wartime difficulties, cheese quality has shown a marked improvement in recent years. Grading percentages for 1945-46 were:—Choice and first, 70·27 per cent.; second, 28·28 per cent.; and third, 1·45 per cent.

An adequate and safe supply of pasteurized milk is becoming available in an increasing number of towns throughout the State, but it is considered that the consumption of fresh milk is much lower than it should be, and nutritional authorities stress the importance of greater volume in liquid milk distribution.

A drought relief scheme financed conjointly by the Commonwealth and State Governments was approved and is being administered by the Department in the direction of assisting farmers in drought-stricken districts by monetary grants where farm income was below the equivalent of 75 per cent. of the income for 1943-44.

The dairy research laboratories at Brisbane, Hamilton, and Toowoomba were busily engaged, throughout the year, in addition to routine investigations, on quality control of dairy products, chemical and engineering investigations and surveys, the training of field officers at short-term dairy schools, and general extension work.

Peanut-Growing.*

J. A. KERR, Senior Adviser in Agriculture.

THE peanut plant is a source of highly nutritious food both for human beings and for farm livestock The uses to which the crop is put are many, and its importance is steadily increasing As a human food, the kernel itself is consumed raw, salted, or roasted; it is used in various forms of confectionery and in margarine manufacture, and is also marketed as peanut paste and oil. Peanut meal contains up to 48 per cent. crude protein and as a stock food ranks as a high-grade palatable product. The crop may be eaten down by pigs, but its consumption by them will result in objectionable qualities in the carcases. Breeding sows and weaners, however, may be fed limited amounts without detriment. The tops of the plant make a useful though rather coarse hay, which is inferior to cowpea hay both in yield and in protein content. The residue of the crop, after threshing to remove the nuts, is often stacked as reserve fodder.

The peanut is regarded as being a native of Brazil, where several closely allied species are found It is an annual summer-growing plant which is easily killed by frost, but it will otherwise adapt itself to a wide range of climate, provided soil conditions are favourable. Moderate rainfall, abundance of sunlight, and comparatively high temperatures are necessary for best results with this crop.

The flavour of the kernel and the type of the shell enclosing it have led to the fruit of the peanut plant being incorrectly known as a nut; as the plant belongs to the pea family, the fruit is really a pod. Like other members of that family, its roots bear numerous nodules containing bacteria which make nitrogen in the air available to the plant.

The peanut plant (Plate 124) grows to a height of from 12 to 18 inches and may be of either a bunched or a running habit, the former type being preferred. Owing to its less straggling habit of growth, cultivation of the bunched type of peanut is much easier and harvesting is very much simpler than in the case of a variety possessing a running habit.

The flowers, which are small and yellow, are borne in the axils of the leaves. After pollination, the flower stalk elongates, bends downwards, and carries the developing pod into the soil (Plate 124). This flower stalk is commonly known as a peg, and the pod does not develop unless the peg penetrates the soil.

---

* Reprinted, with necessary modifications, from *The Queensland Agricultural Journal* for Sept., 1944.

The period of growth in the case of peanuts varies from 16 to 22 weeks, according to the variety grown, the district in which it is grown, and the seasonal conditions experienced during the growth of the crop. Early maturity is usually characteristic of the upright or Spanish type of plants.

The yield of peanuts per acre will naturally vary greatly with soil fertility and with the climatic conditions experienced during growth. Virginia Bunch yields average 100 bushels per acre, though 130 bushels are fairly common and 180 bushels occasionally exceeded. Red Spanish yields average 50 bushels per acre with high yields rarely more than 100 bushels. The average bushel weight of peanuts as delivered by the thresher is 17 lb. for the Virginia Bunch variety and 22 lb. for the Red Spanish variety.

Plate 124.

A PEANUT PLANT SHOWING PEGGING, WHICH IS THE INITIAL FORMATION OF "NUTS."

Suitable Soils.

Well-drained open-textured soils with a high humus content are the most suitable types for the growth of this crop. However, satisfactory crops can be grown on a wide range of soils, but heavy soils which are inclined to become hard and compact should be avoided Heavy soils frequently produce large crops of peanuts, but considerable losses are experienced on them when harvesting, particularly in varieties which readily shed the pod. Other things being equal, sandy loams usually produce the best results.

Rotations for Peanuts.

Observations indicate that the first crop of peanuts on a soil is usually particularly good, yields of as much as 150 bushels per acre being frequently obtained. Uninterrupted cropping with peanuts, however, reduces the yield to an uneconomic level within a few seasons, and in few crops grown under Queensland conditions is a suitable rotation so essential to the maintenance of a satisfactory standard of production.

The eradication of all weeds in the growing crop, which is essential for the successful production of peanuts, combined with the method of harvesting, entailing as it does the removal of practically the whole plant, result in a serious lowering of the humus content of the soil, with a consequent adverse effect on its physical structure. The combined effect thereof is reflected in reduced yields. An undesirable variation in the ratio between the different soil nutrients following continuous cropping with peanuts is probably also responsible for a reduction in yield.

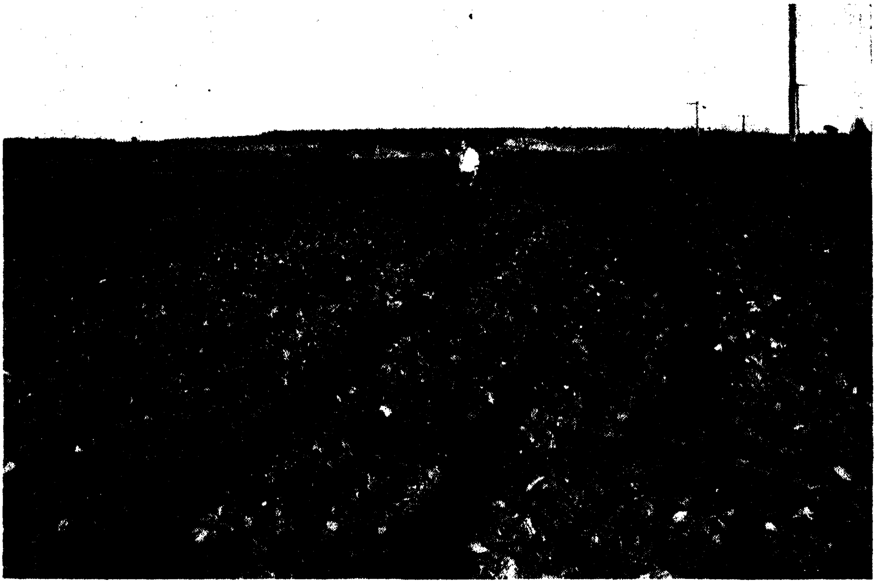


Plate 125.

A FIELD OF PEANUTS IN THE KINGAROY DISTRICT.

The selection of suitable crops for rotation with peanuts depends upon the type of farming practised, but where dairying is combined with peanut-growing the problem is somewhat simplified. Queensland climatic conditions are such that the main selections must be made from summer crops, supplemented where possible, however, by winter crops. Maize, grain sorghums, saccharine sorghums, Sudan grass, white panicum, Japanese millet, and potatoes provide some of the possible selections for summer growing. Cowpeas should also be included in the rotation, but there is some evidence to the effect that they should precede the abovementioned fodder crops rather than the peanut crop.

All residues of ordinary crops included in the rotation should be ploughed in, and in the case of the more open soils a bulky fibrous crop, such as Sudan grass, should be included in the rotation and ploughed in as a green manure prior to the planting of the peanut crop. The beneficial results obtained from Rhodes grass as a soil renovator, as indicated by first-crop peanut returns following that grass, suggest the adoption of the practice of grassing available cultivation areas from time to time for periods of from two to three years.

The restriction of peanut-growing to one crop in three years, or to two crops in five or seven years, may prove to be necessary if satisfactory production is to be maintained. The benefits of the rotation will not be limited to the peanuts, but will also be apparent in the other crops which are included in the cropping programme. A rotation, however, must be adopted at an early stage in the utilization of a farm in order to achieve the highest degree of maintenance of soil fertility, and not merely as a measure adopted at a later date to restore the fertility of soils which have been mined rather than farmed. The use of appropriate fertilizers may prove to be necessary and economically sound in rotations, but fertilizers alone will not be sufficient, and planned rotations, suited to the district and the soil, must be adopted.

Plate 126.

TRACTOR-TYPE PEANUT CUTTER USED IN HARVESTING.

A field comparatively free from weeds should be selected for the production of peanuts in order to reduce hand work in the growing crop, and cultivation prior to planting should be thorough. If no cover crop is being grown during the winter, the first ploughing should be completed by the end of June, and, if the land is not being contour farmed, should be across the slope of the land, which is then allowed to lie in a rough state until the spring. On land subject to erosion, planting on the contour in combination with broad-base terraces and/or strip cropping should be adopted. Spring ploughing should then be followed by cultivation with the object of producing a loose, fairly fine seed-bed and conserving moisture. A further ploughing may be necessary, but the amount of cultivation required will naturally vary with the soil type and with the weather conditions.

Varieties.

Only two varieties are grown extensively in Queensland, these being the Virginia Bunch and the Red Spanish. The former is a strong-growing variety, and produces a large quantity of dark-green foliage. Virginia Bunch plants, on suitable soils, may reach a height of 12 to 18 inches and a diameter of from 24 to 30 inches. The pods are usually borne fairly close to the centre of the plant, but late flowers may develop and fruit along almost the whole length of the branches. The pods are fairly smooth, of good size and shape, and usually contain two pale-coloured kernels. On maturity, these pods generally break off easily, thus resulting in loss in cases in which harvesting is delayed. Peanuts of the best quality of this variety are usually reserved for the "whole nut" trade. The Red Spanish variety is a smaller plant of semi-erect, bushy habit, with light-green foliage. Its pods, which are closely clustered round the main stem, are small and completely filled with two dark-red kernels. On maturity, they do not break off easily, and so do not present a harvesting problem, as may be the case with the Virginia Bunch variety. On account of their high oil content, Red Spanish kernels are frequently used for the oil trade, but they are also used for the manufacture of peanut paste and are consumed as salted and devilled kernels.

Plate 127.

CLOSE VIEW OF CUTTER ATTACHED TO TRACTOR.

Planting.

The planting season extends from October to January, inclusive, the later date of planting being usual in the north. Peanut planters and maize drills fitted with special peanut plates operate in a very satisfactory manner for planting. These mechanical planters plant shelled seed only, and with them even-graded seed is necessary to ensure the fairly regular spacing of plants. Small areas may also be planted by hand in shallow furrows opened at the desired spacing of the rows. When planting is done by hand, the use of shelled seed is not essential. The whole pod or the pod broken in halves may, therefore, be used, but the germination is slower than is the case with shelled seed. Soaking of the pods prior to planting may prove to be advantageous.

A width of 36 inches between rows and a plant spacing of from 10 to 15 inches is recommended for the Virginia Bunch variety, this spacing requiring approximately 30 lb. of seed per acre. For the Red Spanish variety, a width of from 30 to 36 inches between the rows with a plant spacing of from 6 to 10 inches in the row is recommended. The seed of the Red Spanish variety is smaller than that of the Virginia Bunch, and approximately 25 lb. per acre is therefore adequate for the closer spacing usually adopted in the case of the former variety. The seed should be sown at a depth of 2 to 3 inches.

The treatment of Virginia Bunch seed with Ceresan, Agrosan, or similar organic mercury dusts, is very desirable in order to ensure a more satisfactory germination. Crown rot is not entirely prevented by seed treatment and it is a common practice to increase planting rates by as much as 25 per cent. of those recommended in order to provide for seedling losses.

Cultivation of the Crop.

Crop cultivation for the first month after planting may be carried out with light peanut harrows dragged across the rows. Ordinary light lever harrows may also be used. The initial harrowing may be done shortly after the plants appear, and the judicious use of the harrows in this early stage of the growth of the crop considerably reduces later hand work, since harrowing eradicates many weeds in the row. Inter-row cultivation should be continued until the first pods are developing. At least one hand chipping will probably be necessary to ensure the eradication of weeds. During the last cultivation a slight hilling is frequently given with the object of providing a free entrance for the fruiting pegs.

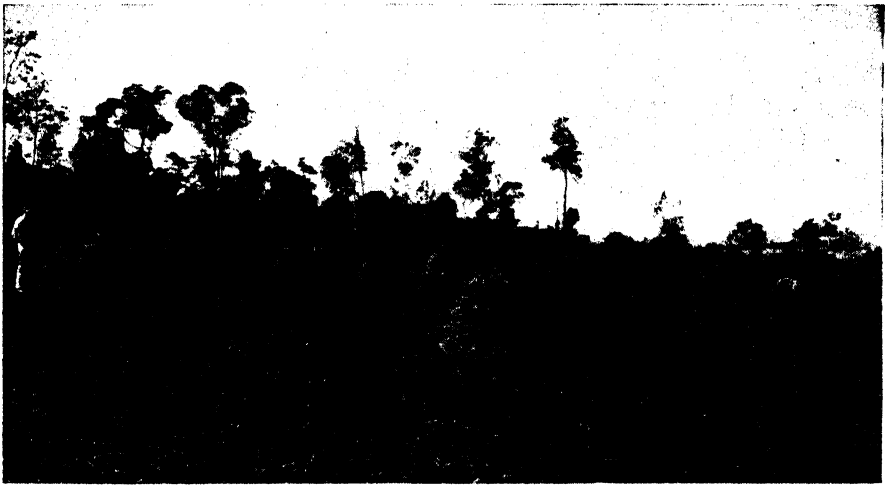


Plate 128.

STOOKED PEANUTS DRYING IN THE FIELD.

Harvesting and Marketing.

As the peanut crop does not mature evenly, harvesting is carried out when the majority of the pods are mature. The plants at that stage usually develop a yellowing of the foliage, but as that is not invariably the case an examination of the pods is necessary before a decision is made to harvest the crop. The inside of the shell usually begins to colour, at least at one end, and shows darkened veins when maturity has been reached. In the case of the Virginia Bunch variety, a few of the early pods are usually lost, but no difficulty in this respect is experienced with the Red Spanish variety, which retains its pods for a considerable period after they have reached maturity.

Although several machines have been developed to cut, pull and deposit peanut plants in bundles in readiness for stooking, none has so far proved entirely satisfactory, and the bulk of the crop is hand-harvested.

Prior to pulling, the tap root is usually cut by means of specially designed cutting blades, adjusted to cut just below the level of the peanuts in the soil. A slight tilt of the cutting blades loosens the soil around the plants and thereby facilitates pulling. Cutters are generally attached in pairs on tractors (Plates 126 and 127), but small areas may be cut by single cutters attached to horse-drawn cultivators. Though rarely used in the main peanut-growing areas, a single furrow mouldboard plough with the mouldboard removed will act as a satisfactory cutter, but the attachment of a special share with an extended blade improves the cutting.

Plate 129.

THRESHING PEANUTS IN THE FIELD.

After cutting, the plants are pulled by hand and placed in bundles of a size convenient for handling when stooking, the soil being simultaneously shaken from the plants.

The usual practice is to stook the plants without support. The plants from eight to twelve rows are generally placed in a single line of stooks, the average size of the stooks being about 36 inches in diameter and 42 inches in height (Plate 128). The first plants are placed on the ground with the pods upwards, followed by some other outer plants with the pods towards the centre. The stooks can then be built in successive layers, each bundle of plants being firmly placed in position with the pods always to the centre of the stook. The last 12 inches are tapered to a point and capped by a plant with the foliage directed downwards with the object of shedding as much rain as possible.

Stacking around poles is occasionally adopted in Queensland for curing the crop prior to threshing. For that purpose, poles about 7 feet long are driven firmly into the ground and two cross-pieces 3 feet long are nailed on to the poles at right angles to each other about 9 inches from the ground. The first plants are placed on these cross-pieces in order to keep the pods off the ground, and the stack is then built round the pole with the pods inside. Towards the top of the pole the plants are so arranged as gradually to taper off the stook, which is capped by using inverted peanut plants or grass. From twenty to thirty poles are required per acre for curing the crop in this manner.

Dry weather is essential for the first week after pulling, in order to allow the plants to dry, but after that period has elapsed rain damage is usually of minor importance, unless continued for long periods. Unfavourable harvesting weather produces a darkening of the pods, and moulds may develop under such conditions, with a consequent loss of quality, and they may even cause the destruction of a large percentage of the crop.

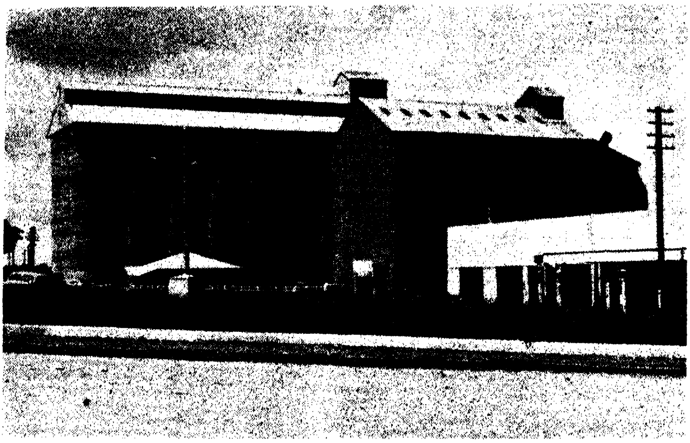


Plate 130.
THE PEANUT SILOS AT KINGAROY.

The peanut plants may remain in the stooks for a period of from 14 to 28 days, the duration of the period depending on the prevailing weather conditions. The plants must be dry and the pods must shatter easily from the pegs before threshing is attempted. Threshing is usually done by contractors who operate machines designed for handling this crop (Plate 129). The stooks are generally conveyed on low wagons to the thresher, which is moved from time to time to convenient positions in the field. The plant residue, after the thresher has removed the pods, is frequently stacked in the field in the position in which it is delivered from the threshing machine, and is subsequently used as fodder.

The Queensland Peanut Board, which was established in 1924, is associated with the marketing of this crop. The Board has erected and controls extensive silos, shelling and cleaning machinery, and other equipment. The main storage facilities are provided at Kingaroy (Plate 130), but there are also Board depôts at Brisbane, Atherton, and Rockhampton.

Land Utilization.

P. J. SKERMAN, Agricultural Resources Officer, Bureau of Investigation.*

QUEENSLAND is fortunate in the possession of a wealth of land resources of sufficient variety to provide for every field of Australian agriculture. Some of these resources have been tapped, but each can be more intensively developed under a sound system of land utilization.

Older countries of the world have learnt to conserve their natural resources. The newer countries—America, South Africa, and Australia—taken generally, are only now beginning to realize the potential wealth to be found in a continually-fertile soil.

Queensland is a State with a brief history, yet there is already plenty of evidence of misuse of land in the past by destruction of forest areas, over-grazing, single crop farming, over-cultivation of sloping land, and indiscriminate burning-off. In far-northern areas some of our finest cabinet timbers have been felled and burnt to make way for dairying. At one time there was little demand for this timber, but in any further opening of land natural timber stands must be adequately considered.

A decision has to be made between forestry and dairying, keeping in mind the erosion hazard on sloping country. Over-grazing by domestic livestock, rabbits, and marsupials, particularly during droughts, has seriously reduced the carrying capacity of pastoral land; single crop farming has reduced the fertility of agricultural lands; and over-cultivation of sloping land, especially in the Darling Downs and Burnett districts, has increased the erosion problem. Regular burning-off is reducing the soil supply of humus, both on wheatlands and coastal grazing areas. The debt structure of the farm has often caused a farmer to abuse his land against his better judgment.

Land utilization is conditioned by climate, soil, water facilities for stock and irrigation, transport, markets, and land tenure. Each type of plant, each species of stock, has its climatic range. To-day, as a result of the efforts of plant-breeders, we have the means whereby the climatic range of plants can be widened by breeding and selection. In this way, wheat-growing has been taken right into the Arctic Circle. Fortunately for us, our tropical North, the sub-tropics, and a temperate climate in the fruit growing area of the Granite Belt put Queensland in the position climatically to become almost self-sufficient in respect of primary production.

Markets present a major problem and must be considered in discussing land utilization. Many of our commodity markets are saturated—we probably cannot economically increase our output of sugar; dairy products and wool will meet stern competition from substitutes; rice production and dried fruits have become the prerogative of southern States. Hence meat, cotton, tobacco, timber, canned tropical fruit, and grain-growing at present offer the best prospects. Adequate transport of produce by road or rail must also be considered.

---

* In a broadcast talk.

Soil Surveys.

Having decided upon possible crops, it is then necessary to determine whether they can be grown, and herein lies the importance of soil types within a climatic range. It is now realized that a comprehensive soil survey is basic for intelligent land utilization.

After World War I the Murrumbidgee Irrigation Area was opened for settlement without a preliminary soil survey. Later, it was found that its yield of citrus fruits was seriously declining, and a survey conducted in 1940 showed that of 6,000 acres of citrus only 53 per cent. of the trees were healthy, 25 per cent. were slightly unhealthy, and 22 per cent. were very unhealthy. The outstanding cause was excessive soil moisture associated with root decay caused by poor underdrainage of the heavy soils. Drainage is always costly, and the position was aggravated by the proximity of the citrus areas to the heavily irrigated rice-fields.

Through the efforts of the Council for Scientific and Industrial Research and State officers with detailed soil surveys, studies in irrigation methods, drainage layout, tree-health, combined with an overall aerial survey, the Murrumbidgee Irrigation Area is now the most intensely studied and best understood agricultural region in Australia. A land-use map has been drawn up for future development of the area, and an endeavour is being made to switch unsuitable citrus areas over to pasture.

The lesson to be learned here is that it would have been well worth while to conduct some of these investigations before opening the land for settlement.

Water Supply.

The recent drought conditions within this State have again focussed public attention on water. Land cannot be utilized without an adequate supply of water for domestic and stock purposes, and it can be more intensely farmed if a source of water for irrigation is available. Unfortunately, over a large portion of the State provision of water is the most difficult single problem. Some of our best pastoral land in Queensland remains under-developed because of the lack of adequate water supplies.

The destruction of prickly pear by the cactoblastis caterpillar gave Queensland back its great belt of brigalow country. This area has unsatisfactory underground water, and surface catchments are frequently failures. As a considerable area of this country is involved in soldier settlement schemes, the Government is wisely conducting hydrological investigations before opening areas for settlement. For irrigation settlement it is necessary to know water storage sites, capacities, water quality, areas capable of being watered, irrigation layout, and costs of water, in addition to the likely reaction of the soils to continuous watering.

Living Area.

A question which has arisen time and again is that of living areas, and it is important that careful consideration be given to this matter, keeping in mind the aim of permanent agriculture. The man with a small area may be inclined to overstock and overcrop in an endeavour to secure a reasonable living, with consequent deterioration in the fertility of the land. Short term leases and tenant farming may act in a similar way. The recent *Agricultural Holdings Act* of New South Wales provides for landlord-tenant relationships whereby the fertility of the land is protected.

Rural Amenities.

Finally, the provision of rural amenities such as adequate educational facilities, modern hospitals, rural electrification, and library services will help to consummate the foregoing efforts towards full utilization of the land.

Planning for the Future.

The Queensland Bureau of Investigation set up under *The Land and Water Resources Development Act of* 1943 is charged with the simultaneous development of the land and water resources of the State, and to evolve a plan whereby those resources will be utilized to the fullest possible extent and with the greatest efficiency. Composed as it is of representatives of each department concerned with the State's land and water resources, its technical officers have access to the results of all the investigations which have been carried out in connection with any lands under consideration, as well as the results of the experimental work of the Department of Agriculture and Stock. With this collated information as a basis, additional investigations are proceeding whereby the full potentiality of any particular area can be assessed. Recommendations will then be made by the Bureau to have the land put to its fullest use.

* * *

Plate 131.

STACKING GRASS HAY ON MOUNT HUTTON, INJUNE, NEAR ROMA.—This hay was the second cut from the same paddock, and was taken off six weeks after a 90-point storm. The hay proved to be of excellent quality, relished by both cattle and horses. Cows milked well on it and working horses kept their condition during this year's severe drought.

The 1946 Burdekin Flood.

W. J. S. SLOAN.*

ALTHOUGH it is difficult to give accurate details of flood and cyclone damage, sufficient data are available to indicate that the aggregate losses suffered by cane farmers generally of the Lower Burdekin were less in 1946 than in the 1940 flood (see *Cane Growers' Quarterly Bulletin,* July, 1940, October, 1940, and July, 1941). The flood waters were higher in some places and lower in others, but the overall picture shows that the level was lower in 1946, although the water remained over the banks many hours longer. The warning stations up-river and the timely broadcasts concerning changes in the river levels were valuable in forewarning interested communities of the expected flood and no doubt made a vital contribution to the welfare of affected districts by avoiding loss of life and minimising property damage. However, the supply position in respect of building materials and replacements for lost or damaged equipment is very unsatisfactory and has added greatly to the difficulties of farmers endeavouring to restore their properties to working order again.

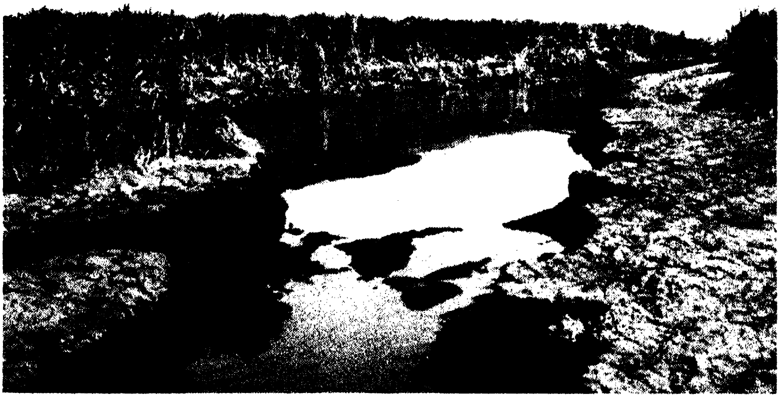


Plate 132.

SEVERE EROSION ALONG HEADLAND EXTENDING INTO STANDING CANE.

The most serious breaks in the river banks were chiefly those which figured in the 1940 flood. Damage to cane crops was not as great as initial estimates indicated but the decrease in sugar produced in the Lower Burdekin from direct and indirect effects of the flood and cyclone is predicted by local observers to be in the vicinity of 20 per cent. Cyclonic winds flattened much cane, particularly in early planted fields which had six feet or more of cane at the time, but there were few extensive areas of broken sticks, and fortunately, lodged cane later recovered very well. Because of the comparatively long immersion of the cane, some shooting of eyes and roots occurred and death of the growing point was caused by silting in some cases. Patches of cane in low lying and poorly drained areas died out completely.

---

* In *The Cane Growers' Quarterly Bulletin* (Bureau of Sugar Experiment Stations, Department of Agriculture and Stock, Queensland) for July, 1946.

Deposits of sand and silt to depths of up to eight feet were left both in standing cane and on fallow fields. Not all deposits were harmful and a few fields were enriched by a layer of fertile silt. Curiously enough, occasional fields which were seriously eroded in 1940 received a useful layer of silt this time. Scooping and levelling are expected to reclaim for profitable cane growing most of the areas affected by sand deposits.

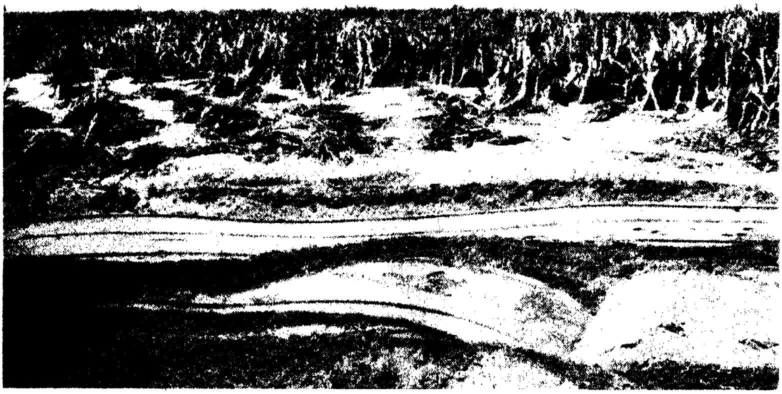


Plate 133.

CANE PARTLY BURIED BY SAND DEPOSITS. SCOOPING IN PROGRESS ON ADJACENT FALLOW FIELD IN FOREGROUND.

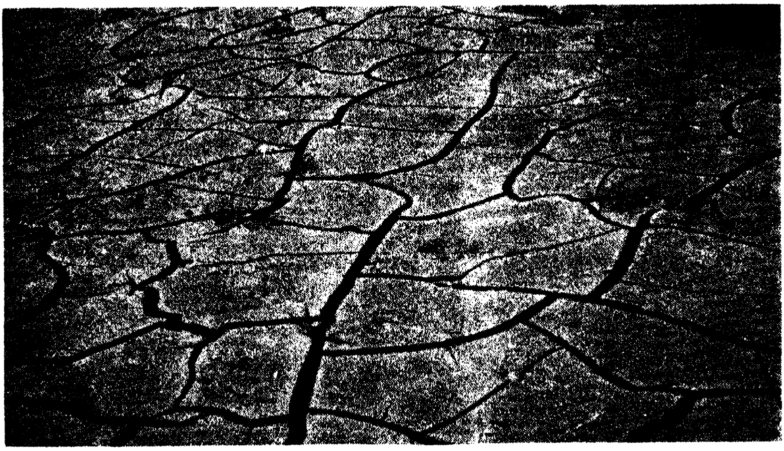


Plate 134.

HEAVY DEPOSIT OF FERTILE SILT ON A FALLOW FIELD.

The extent of sand deposits in standing cane cannot be accurately gauged but in many fields the indirect loss brought about by the blocking of irrigation furrows is considerable. Thus a large area will have to depend on natural rainfall until harvest and unfortunately droughty conditions followed the flood.

Many pumping plants were submerged and coated with silt; damage to these and overhead fluming was extensive. In several instances, the rise in the underground water level in wells temporarily put irrigation pumps out of action.

Flood effects are always more serious in furrow-irrigated areas, because levelling and grading are required to remake the fields suitable for irrigation. Following the 1940 Burdekin flood, certain recommendations were made and works carried out for the primary purpose of protecting the river banks and minimising the scouring effect of flood waters. Furthermore, a Burdekin River Trust was created. The duties of this authority were to maintain and carry out additions to protective works constructed along the river banks, in accordance with instructions from the Co-ordinator-General of Public Works. It was also empowered to plant and maintain various species of soil-binding plants along the river bank.

Plate 135.

RIVER SIDE OF A BULKHEAD SHOWING DEAD DURANTA AND CLERODENDRON, WHICH HELPED THE DEPOSITIONS OF SILT.

Protective works which were constructed comprised timber bulkheads and earth levees, located at selected weak places in the river banks. The protection of the river bank by planting grasses, shrubs and trees to provide a dense vegetative cover over a strip one and a-half to two chains wide on each side of the river along 29 miles of the danger area, particularly around low portions of the river bank, was strongly recommended. The voluntary co-operation of farmers was sought, firstly in regard to ceasing the practice of cultivating to the edge of the river bank, and secondly in recognising the need for not ploughing out any volunteer ratoon cane, until after mid-April, within five chains of the river bank reserve where such land was to be prepared for planting.

The object in constructing permanent bulkheads was to induce silting of the gullies at the low points adjacent to the river banks by checking the flow of flood waters. These were to serve primarily as a safeguard in times of high flood until such time as heavy vegetative cover had been established both in front of and behind the bulkhead for prevention of any scouring. In the 1946 flood some of the bulkheads were destroyed while others completely withstood the flood. In any case the bulkheads all gave some relief and appeared to be effective except where a fresh break occurred at the end.

Plate 136.

NEW EROSION CAUSED BY A FRESH BREAK AROUND THE END OF A BULKHEAD.

It has been suggested by local residents that trees and vegetation growing in the river bed impede the flood waters. Thus the rate of discharge of the river is checked, flood waters tend to build up and be diverted towards the banks while the sand deposits around the tree growth in the river are gradually raising portions of the river bed. Such being the case it is not unlikely that each high flood will form a series of new breaks in the river banks until such time as the latter are adequately protected with a dense cover of suitable vegetation.

A considerable amount of work has been done in planting and establishing soil binding plants along the river bank but much remains to be done. In the early phase of reconstruction work after the 1940 flood, *Duranta* hedge was planted freely but later was replaced by the shrub *Clerodendron* because of the superior drought resistance of the latter. Guinea grass was a satisfactory cover in places, but where the water flow was fast its shallow rooting system was torn out of the ground and the flood waters then commenced to scour a deeper hole where the plant had been. Giant bamboo which had been established only a few years exhibited a similar weakness. However, this plant when well established should be excellent for the purpose of slowing down flood waters and preventing excessive erosion of the banks.

The Trust intends to plant tamarind trees extensively, for they possess a good rooting system and stand up well to dry conditions. Among other trees for trial is black bean, which has given good results on the Haughton River at Giru. Para grass, a common fodder grass grown around swamps and along the banks of creeks in many parts of Queensland, has also shown promise for controlling stream bank erosion, because it flattens on the ground and protects the soil as the water passes over it. Elephant grass, a vigorous, hardy, tall growing grass, may also prove to be valuable as a soil retaining plant.

Experience during the recent flood clearly showed that revegetation needs to be done thoroughly over a substantial area of the bank. In one instance natural plant cover over one chain between the bank and the edge of the cultivation was insufficient to prevent scouring in the latter. The tendency still shown by some farmers to disregard the warning not to cultivate right to the edge of the bank, is regrettable. In practically every case where a break occurred, ploughing in this manner was responsible. Unfortunately, in a number of these cases it was a neighbouring farmer who suffered the greater damage.

Although the 1946 flood occurred earlier than that in 1940, a large amount of land had been ploughed just prior to the flood and losses on some farms were heavy. Once again the retaining properties of a grass cover were plain to observe on the few areas which had not been ploughed. The inconvenience and perhaps loss of crop associated with late preparation and late planting are realised, but are unquestionably a small price to pay for the protection of cultivated land directly threatened by flood erosion which, even if not disastrous, may prove costly to repair.

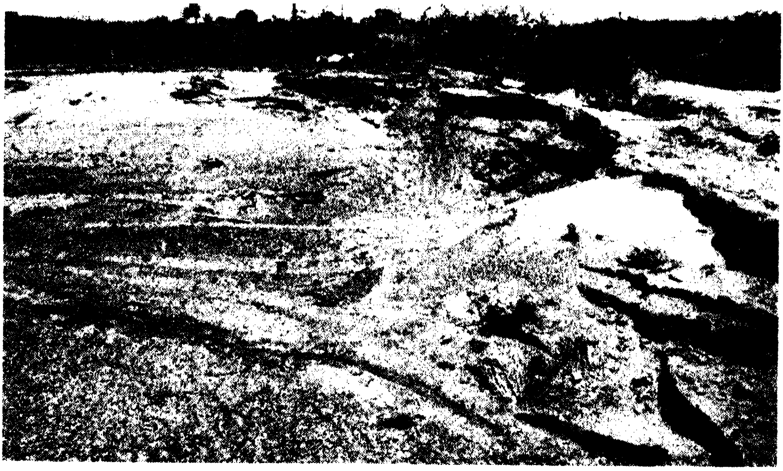


Plate 137.

DEEP HOLE IN RIVER END OF CANE FIELD WHERE FLOOD WATERS BROKE THROUGH.—Bank on right was held together by molasses seepage from a mill drain.

The flood of 1946 caused much soil erosion which could otherwise have been avoided had those concerned fully appreciated the precautionary measures required. Any project to combat soil erosion needs the wholehearted and sincere co-operation of all members of the community in the affected area, to achieve any considerable measure of success. One section alone cannot solve the problem. Negligence on the part of a small number of farmers situated along vital portions of the river bank may menace many.

Cabbage-Growing.

C. N. MORGAN, Senior Adviser in Horticulture.

CABBAGE is among the more important vegetables required for the domestic market. It is adapted naturally to cool climates and is, therefore, more favoured as a winter crop in Queensland. However, by the selection of suitable varieties, the season of production may be extended. Normally summer production is confined to the regions of high altitude in the southern portion of the State, notably around Stanthorpe. In the coastal districts production during the hot months of the year was formerly fairly difficult owing chiefly to the lack of satisfactory pest control methods. With the advent of D.D.T., however, this problem is not serious; and, therefore, it should be possible to produce sufficient cabbage for Queensland requirements practically the whole year round.

Seed-beds.

The seed should be sown in beds of well-drained, deeply and thoroughly worked soil. Seed-beds should not be too rich; otherwise the young plants find their food too easily, do not develop a good root system, and are soft and may not be easily transplanted. If, on the other hand, the soil is very poor, a small quantity of fertilizer may be added to it about a week before sowing the seeds.

After raking the surface of the bed to make it smooth, it should be firmed with a flat board, and the seed then sown thinly in shallow drills, not more than ½-inch in depth and about 4 inches apart. After sowing the seed, the surface of the bed should be mulched with well-rotted leaf mould or old manure, or covered with bags, in order to retain the moisture in the soil; this is necessary for the germination of the seed. If the beds are covered with bags care should be taken to remove them immediately the young plants begin to show.

Germination of cabbage seed is particularly quick. The young seedlings will appear in from three to four days in warm weather but will take considerably longer during colder months, probably from two to three weeks. Approximately 6-8 oz. of seed should be ample to provide enough cabbage plants for one acre.

Seed-beds should be watered regularly, otherwise the growth of the young seedlings will be checked, resulting in unsatisfactory plants. When large enough to handle, the seedlings may be thinned, if desired, to about half an inch apart; if they are grown too thickly, they develop into long, spindly, weak plants.

If it is very hot during the middle of the day, shading may be necessary, but this shade should be removed entirely as soon as the plants are strong enough to withstand the heat. Over-shading also produces long, spindly plants, which are soft and difficult to transplant.

Transplanting.

In from three to six weeks, according to the time of the year, the young plants should be large enough for transplanting. About a day or two before transplanting they should be hardened off, by withholding water. Immediately before transplanting, however, the plants may be given a good watering, as this will facilitate their removal from the seed-bed without excessive injury to the young rootlets. For preference, transplanting should be done during cloudy or showery weather. If weather conditions are unfavourable the young seedlings should be watered in; and, as a further precaution, particularly if the plants are fairly large, the top half of the leaves may be cut off to lessen evaporation of moisture from the plants until the new root system is firmly established. At all times during transplanting the roots of the young plants should be kept damp, and this may be done by standing the plants in a bucket containing a puddle of soil and water or carrying them in containers which allow the plants to be covered with wet bags.

In planting, a hole is first made in the ground, usually by a small hoe or by hand, and this should be deep enough to allow the roots of the seedling to reach the bottom. A little earth is turned in and the plant then drawn slightly upwards before pressing the soil firmly around it. This ensures that the main root is not doubled up.

If irrigating, the rows should be not less than 2 ft. 6 in. apart and the plants set out at least 1 ft. 6 in. apart in the row. Without irrigation, planting a little wider is recommended.

Fertilizing.

The application of chemical and organic fertilizers will do much to ensure quick and successful growth of cabbage, and there are a number of commercial mixtures of complete fertilizers on the market which have proved satisfactory for cabbage growing. A mixture with a formula in the vicinity of 5-12-5, and containing a fair proportion of organic matter such as blood and bone, is recommended for use as a basal dressing.

Whilst the rate of application of fertilizers varies in different districts, and actually on different farms—each experienced grower having his own views on the matter—as a general guide 10 cwt. to 15 cwt. to the acre may be applied. The method of application is to broadcast along the lines where it is intended the rows of cabbage shall be, and to scuffle the fertilizer in a week or more before planting. Blood and bone fertilizer is most popular in some districts as a base dressing.

If considered necessary, after about 4-6 weeks' growth, a side dressing of from 8-10 cwt. to the acre of a quick-acting complete fertilizer with a formula somewhat similar to that used for the basal dressing may be given. At hearting, a dressing of 2-3 cwt. of sulphate of ammonia or nitrate of soda will also be of considerable advantage.

For successful cropping, cabbage should be grown quickly. Therefore, on no account should growth be allowed to be checked. It is only possible to ensure continuance of growth by regular cultivation, watering when the weather is dry, and taking care that the plants do not lack an ample food supply.

Varieties.

Selection of the right varieties for different times of the year is important. In coastal districts, winter-planted types should be early and quick maturing. Seed of the early varieties is sown in the autumn, but the main crop varieties should be sown to allow planting out from June to August. Early coastal seed planting may be done during December and early January. In the Stanthorpe area seed may be sown from early spring to December.

Recommended varieties are:—

EARLY:—Early All Head, Early Drumhead, Henderson's Succession, and Select Succession.

All of these varieties are large, early, and quick growers.

MAIN CROP:—All Seasons and Succession.

The latter is a most popular variety, and may be grown at almost any time of the year and in practically every district; it is a good, large Drumhead type.

Drumhead is also a good variety; it is hardy, slightly larger than Succession, and matures a few weeks later.

Marketing.

Cabbage should be marketed as soon as practicable after cutting, and only good firm-hearted heads should be sent in. Care in handling is essential, and when placed in bags for railing at least some of the older outside leaves should be allowed to remain, as protection for the hearts against bruising, and the heads should be packed in the bags as firmly as possible.

ANSWERS.

(Selected from the outgoing mail of the Government Botanist.)

Red Natal Grass.

G.A.C. (Bell)—

The specimen is Red Natal Grass (*Rhynchelytrum repens*). This grass was introduced many years ago as a fodder by the Queensland Acclimatisation Society, and is now very widely spread in the coastal parts of the State. It is especially abundant along railway embankments and in old cultivation areas. It is not very closely allied to Rhodes Grass and is not a particularly good fodder. In coastal Queensland it is a fairly common weed of cultivation, especially on fruit farms, where it is used as a "chop-chop" for working horses and for cattle.

"Castor Oil" Plant.

Inquirer (Warwick)—

The specimen is *Datura ferox*, a plant closely allied to the common Stramonium. It is miscalled "Castor Oil" on the Darling Downs and parts of Western Queensland. The plant is supposed to be a native of Southern Europe, and first made its appearance in Queensland about Macalister twenty odd years ago. It has spread slowly, but has never become the common pest that Stramonium or Thorn Apple has. Once it gets established in a locality, however, it has every possibility of becoming a serious pest, especially as it is poisonous to stock. Although this plant and the common Stramonium (*Datura stramonium*) are nearly always referred to as "Castor Oil" on the Darling Downs, the true castor oil of commerce is a different and much larger plant, which is naturalised in the coastal parts of the State.

PLANT PROTECTION

Seasonal Notes on the Control of Vegetable Diseases.

J. E. C. ABERDEEN, Plant Pathologist.

Tomatoes.

THE increased price of tomatoes after the Stanthorpe season finishes induces many growers in other districts to attempt to have fruit on the market at that time. To do this means a series of plantings into the field during the months of January and February. For many districts this is a very difficult period for tomato production, owing principally to the incidence of several forms of wilt and the high temperatures at that time.

The two main diseases concerned, bacterial wilt and Fusarium wilt, both persist in the soil and as a result no control by the use of sprays is possible. Bacterial wilt has rather striking symptoms, as a vigorous-looking plant wilts rapidly in one or two days without any warning signs. Fusarium wilt, however, usually produces a yellowing of the older leaves, and when the plant commences to wilt it is a much slower process than for bacterial wilt, sometimes extending over weeks. As nothing can be done to cure an infected plant, control of these diseases depends on the grower's forethought in the choice of varieties and planting site.

There is only one variety of tomato which shows any resistance to bacterial wilt and that is Sensation. It must be trellised, however, to obtain a reasonably-sized fruit and, though possessing an attractive marketing appearance, the internal fruit characteristics are not all that is to be desired. It must also be made clear here that the term "wilt-resistant" as applied to some varieties does not mean resistance to bacterial wilt. In most districts where bacterial wilt is present there is evidence that the disease is far more prevalent on the lower, moister types of soil, so plantings should be confined to the drier ridges. If this cannot be done, then it is recommended that planting into the field be delayed until at least April, because the disease does not affect the winter crops.

Fusarium wilt is present in the majority of soils of all tomato-growing areas and control depends almost entirely on the planting of wilt-resistant varieties in the first place. Actually this term "wilt-resistant" may be misleading, as none of the common varieties so listed is entirely resistant to Fusarium wilt. Though considerably more resistant than the old Chalk's Early Jewel, they may still show a percentage of the disease in the hotter months of the year. In addition to possessing some degree of wilt resistance, a heavy-leafed bush is required to prevent sunscald in the January plantings. Rutgers is probably the best variety for these earliest plantings, with Pearson and

Pritchard also very useful. It is advisable to keep Break o' Day and Red Marhio and those varieties with lighter foliage for planting after February.

Target spot may worry some growers by attacking plants in the seed-bed and in the field. The best preventive measure is regular use of a copper fungicide as either a spray or a dust.

Cabbage and Cauliflowers.

The disease most likely to appear on cabbages and cauliflowers is black rot and the control of this depends entirely on seed treatment. The method of seed treatment with heat, or corrosive sublimate, was discussed in detail in the September issue of this Journal in an article "Black rot and black leg of cabbage and cauliflower." Heavy rains early in 1946 were responsible for a widespread incidence of black rot, and as this may be repeated in the early part of 1947 the necessity for taking precautions to control the disease is re-emphasized now.

Downy mildew is not likely to appear in the seed-beds during the hotter months, but if such does happen then the use of a copper spray gives ready control.

Lettuce.

Septoria leaf spot is widespread on lettuce and will almost certainly appear during the summer. Fortunately, it is seldom a serious disease unless the plant growth has been retarded by unfavourable conditions. Hence, the most important point in raising healthy lettuce at this time of the year is to maintain a rapid and vigorous growth with the aid of ample moisture and good cultural methods.

Carrots.

Carrots are usually free from serious troubles, but there are several leaf diseases that may cause damage if rain is frequent. The reduction in yield is usually insignificant, but if marketing the carrots with tops the price may be adversely affected by the damaged leaf. Any of the copper sprays will control these troubles, but applications should be made in the early stages and discontinued during the last few weeks prior to harvesting to avoid discolouration of the tops.

Crown rot may appear in the warmer weather. This disease is very spasmodic and difficult to control. The first indication of its presence is a collapse of the leaves of the plant commencing with the oldest, and on examining them they are seen to be rotted off immediately at soil level. There is as yet no sure control of this disease, so the grower is advised to keep a close watch for its first appearance and then, if possible, avoid excessive moisture, particularly on the soil surface. More definite advice on this problem may be possible after further experimental work is completed in the near future.

HOME MADE RAIN GAUGES.

In the October *Journal* (p. 203) it was mentioned that rain-water collected in a home made rain gauge could be accurately measured in a graduated 1-inch measuring glass. Actually, the method of graduation given applies only where a 5-inch funnel has been used, and different graduations would have to be calculated for funnels of different sizes.

Maori Mite Control in Midsummer.

A. W. S. MAY, Assistant Entomologist.

MAORI mite, which renders large quantities of citrus fruit unfit for market or considerably lowers its market value, is an important pest each year. It is usual to associate a brown discolouration on the rind of fruits with the activity of this pest, but severe damage to leaf and twig growth may occur during periods of intense mite infestation.

The late winter application of a lime-sulphur spray, at the strength of 1 part of the commercial concentrate to 15 parts of water, is a necessary part of maori mite control measures and should always be used. The success of the treatment is dependent on the efficiency of spray application. Although this spray greatly reduces the over-wintering mite population, complete eradication is seldom achieved, since some of the over-wintering mites may survive the treatment and rapidly increase in numbers during spring. The time taken for this pest to complete its development is very brief, particularly during the midsummer months from early November onwards. Thus, even though an application of lime-sulphur has been made in late winter, growers may experience quite considerable injury to fruits during the summer period. This phenomenon is not uncommon in coastal districts where maori mite is of major importance each year, and it occurs, to a lesser extent, in inland areas.

The maori mite is extremely small and hardly visible to the naked eye. Heavy infestation with consequential severe losses at a later date may be taking place unknown to the grower unless he keeps a close watch on his trees during the summer months. The presence of this mite in considerable numbers does, however, produce a "dusty" appearance on the fruit owing to the very large numbers of cast skins on the rind. Once this is observed, control measures should be applied as soon as possible. Delay at this stage will result in severe fruit discolouration.

The difficulty of observing the mite populations on the trees before injury becomes noticeable does suggest that orchardists should adopt the practice of preventive spraying. For this purpose, control measures may be applied to all varieties of citrus between late November and mid-January, but preferably as early in this period as practicable. A late November or December application of the insecticide does not necessarily complete the seasonal campaign against maori mite and growers are advised to examine their trees carefully between mid-January and March for indications of a further build-up of this pest, particularly in the case of late maturing varieties.

A lime-sulphur spray gives effective control of the maori mite at the period mentioned. It should be applied where possible, but a certain degree of care is required when treatments are made during the midsummer months. The spray strength should not exceed 1 in 35 during this period and cool weather should be chosen for spraying to obviate any risk of injury to fruit and foliage that might occur if temperatures are excessive. High midday temperatures are commonly associated with spray injury to the trees, particularly in the foliage and fruits exposed to the direct rays of the sun. Trees should not be sprayed if they are suffering from a lack of soil moisture. This difficulty can be overcome where irrigation is available, but in non-irrigated orchards it is advisable to postpone spraying until more favourable conditions prevail.

Growers may adopt the practice of using a 1:1 sulphur-lime dust if treatment is contemplated in the mid- or late-summer period, for not only is this material applied more easily than a lime-sulphur spray, but the risk of tree injury is reduced to an appreciable degree. However, less efficient control of the pest may be expected from this treatment. The risk of tree injury may also be reduced, and at the same time a higher degree of mite control obtained than is possible with a dust, by applying a wettable sulphur spray at this period.

The possible use of copper or oil sprays during late November may necessitate some modifications in the timing of measures designed for maori mite control. An interval of at least one month should elapse after the application of an oil spray before lime-sulphur and wettable sulphur sprays or sulphur dusts are applied. Again, lime-sulphur used soon after copper sprays may produce a dark stain on the trees, and it is advisable to allow at least one week between these treatments.

Although oil sprays and fumigation may check the development of maori mite, too much reliance should not be placed on their value. It is preferable to adopt a summer sulphur treatment designed primarily for maori mite control and so prevent the build-up of a population to levels at which rind damage becomes obvious. If the necessary precautions are taken in implementing this control measure, the problem of maori mite control can be solved.

Losses from Water Blister can be Avoided.

T. McKNIGHT, Assistant Pathologist.

DURING last summer water blister (soft rot) disease again caused serious wastage in Queensland pineapples in transit to southern markets.

Measures to avoid wastage from this disease are well understood, and recurring losses are a certain indication that a grower has either completely neglected, or has very carelessly attended to, the disposal of discarded tops, knobs, fruit, leaves and other trimmings. This refuse, in and around the packing shed, is the breeding ground of the water blister fungus. In summer the fungus rapidly rots this discarded material and at the same time forms countless numbers of spores on the surface which are carried in the air and enter the fruit during packing operations through abrasions and bruises on the sides and shoulders, through the stem end, and occasionally through the broken top. As a result of this infection, originating on the plantation, water blister develops in the fruit during transport.

In their own interests, all growers are strongly urged to dispose of discarded pineapple material from in and around their packing sheds. Sheds should then be thoroughly sprayed with a 5 per cent. solution of formalin before the summer crop begins to ripen. From then on the disposal of discarded tops and other refuse should be carefully undertaken after every packing day.

Packing sheds with dirt floors should be sprayed with formalin at regular intervals, as these are difficult to keep free from infective material, particularly of knobs and leaf trimmings which rot and produce spores on the surface of the soil.

Finally, careful handling during picking and packing operations, and the rejection of cracked, sun-burned, "weeping" and "knobby" fruit are measures that must be adopted, as fruit with broken skin are highly susceptible to attack by the water blister fungus.

Plate 138.
ON THE ROAD TO BUNGIL BAY, NORTH QUEENSLAND.

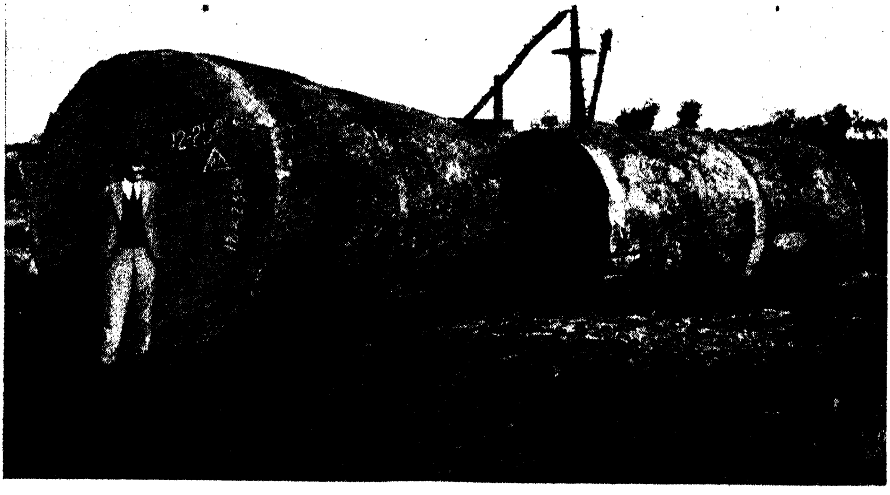
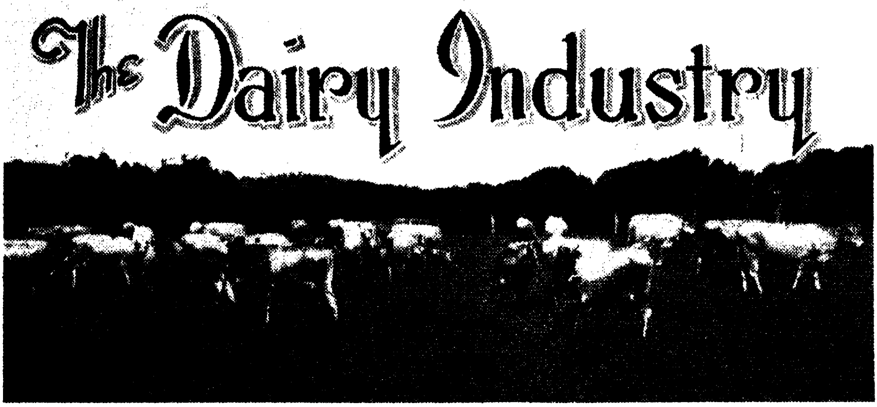


Plate 139.
KAURI LOGS AT DANBULLA, NORTH QUEENSLAND.



Queensland Butter Production, 1945-46.

AS set out in the Annual Report of the Department of Agriculture and Stock for the year ended 30th June, 1946, the output of Queensland butter factories for last year was 101,242,498 lb., of an estimated value of £7,493,436. Although this production exceeded that of the previous year by 6,236,959 lb. the effect of adverse seasonal conditions and war-caused disabilities is clearly seen in the subjoined table showing butter production from 1938-39 to 1945-46:—

Year.	Tons.
1938-39	68,919
1939-40	62,408
1940-41	52,268
1941-42	42,712
1942-43	49,782
1943-44	45,275
1944-45	42,413
1945-46	45,197

With a decrease in the abnormal liquid milk requirements of recent years, because of the ending of the war and the withdrawal of service personnel from Queensland, the easing of labour disabilities on dairy farms and an improvement in the machinery and equipment supply position, butter production should gradually return to its pre-war level.

The average payout to suppliers by Queensland factories in recent years has been:—

	Commercial Butter. Per lb.	
Year.	*s.*	*d.*
1938-39	1	1.55
1939-40	1	2·02
1940-41	1	1.88
1941-42	1	1·63
1942-43	1	3·9
1943-44	1	6·8
1944-45	1	7·9
1945-46	1	7·9

A departure has been made in the method of allocation of Commonwealth Government subsidy. As from 1st April, 1946, the subsidy became payable on a flat rate in contrast with the "flush" and "non-flush" seasonal differential subsidy rates paid from 1st April, 1944, to 31st March, 1946.

The Commonwealth Government has approved a continuance of the subsidy to the dairying industry until 31st March, 1947, such subsidy being estimated to return dairy farmers 1s. 7½d. per lb. commercial butter equivalent at the factory for their produce. Details of this amount for commercial butter representing average farm costs, including transport of cream from the farm to the factory, are as follows:—

		Per lb.	
	d.	s.	d.
Farm working and maintenance costs ..			5·437
Depreciation	1·370		
Fuel (100 per cent., milking machines and motor vehicles)	1·052		
Repairs and replacements	0·487		
Fodder, seed, and fertilizer	0·956		
Rates and taxes	0·343		
Other costs	1·229		
	5·437		
Capital charges (interest)			3·663
Labour reward			10·400
Management allowance of 25s. per week for the farmer	1·108		
Workers' wages, including the farmer himself at award rate	9·292		
Average farm production cost		1	7·500

Of the total butter production 83·18 per cent. was officially examined by Commonwealth and State grading staffs.

Grading results were:—

	Boxes.	Per cent.
Choice grade	549,357	36·86
First grade	835,026	56·03
Second grade	92,439	6·21
Pastry grade	13,463	1·09

The subjoined table sets out the grading results in recent years:—

Year.	Grades.			
	Choice.	First.	Second.	Pastry.
	Per cent.	Per cent.	Per cent.	Per cent.
1938–39 Export only	51·06	38·24	9·97	·73
1939–40 Export only	49·9	37·4	11·8	·97
1940–41 Export only	49·26	38·1	11·3	1·34
1941–42	52·51	41·11	5·77	·61
1942–43	54·94	39·94	4·68	·44
1943–44	52·0	43·0	5·0	..
1944–45	45·37	47·4	6·53	·7
1945–46	36·53	55·52	6·87	1·08

Butter quality showed a further decline. The abnormal incidence of weed-tainted butter was largely the cause of the deterioration in the year's gradings in comparison with those of the preceding season; nevertheless, the consistent downward tendency of recent years should be arrested now that the war is over and a more determined approach made to the problem of raising quality by all sections of the industry, particularly at the source of production. Given a raw product of the requisite quality, the well-equipped Queensland factories are capable of processing it into butter comparable in quality with that of any other country. The assured market now available until 1948, when the present Imperial contract expires, should not be viewed complacently; intensive competition both from the produce of other countries and from butter substitutes can be expected within the next few years.

Weeds on pasture lands, especially on the "scrub" lands, are causing concern to the butter industry because of their tainting effect on dairy produce. Taints of this nature are not diminished by existing factory processes. Studies aimed at reducing or eliminating the intensity of weed flavours in butter have been commenced in Queensland by the Council for Scientific and Industrial Research.

In the year under review streaky and mottle texture defects were prevalent in the butter output of some factories. The cause of the relatively high incidence of this condition has, however, not been clearly determined.

In the course of the year 100-box butter churns were installed in two Queensland factories. Previously the 40-box churn was the largest used. Four years ago an all-metal churn was installed in one factory, but the capacity of this type of churn, which at present does not exceed 2,000 lb., is likely to limit its installation in larger factories.

Field officers of the Division have continued to provide the liaison between the Dairy Research Branch and the factories so far as the operations of the butter improvement service are concerned. The Queensland Butter Board again contributed £1,000 as a grant towards this service, by means of which butter from all factories is regularly sampled and examined chemically and bacteriologically. Despite the inability to install new equipment in the last few years and, in fact, the difficulty of maintaining efficiently existing equipment, especially churns—the main contaminatory factor in a modern butter factory—the biological control of butter manufacture was, in the circumstances, well maintained. There has been, too, consistent progress in the control of the composition of butter in the six years since the butter improvement service was inaugurated, but some factories have not given this important economic aspect of manufacture the attention it warrants.

PRODUCTION, PAYMENTS, AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1946.

Factory.		Manufacture and Payments in Lb.					Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Atherton	Make	1,763,872	1,747,912	..	15,960	..	66,287	70,973	14·57
	Pay	1,768,558	1,754,538	..	14,020	..	3·90%	4·18%	
Bushy Creek	Make	28,052	16,578	11,474	..	..	316	304	..
	Pay	28,040	16,572	11,468	..	..	1·14%	1·10%	
Caboolture	Make	1,981,935	1,808,167	172,704	1,064	..	70,737	70,478	75·97
	Pay	1,981,676	1,838,047	138,800	4,829	..	3·70%	3·69%	
Eumundi	Make	2,017,713	1,871,679	146,034	..	..	56,726	55,912	88·63
	Pay	2,016,899	1,898,622	118,106	171	..	2·89%	2·85%	
Pomona	Make	1,286,420	1,210,857	75,563	..	..	32,323	32,134	95·78
	Pay	1,286,231	1,246,575	39,231	425	..	2·58%	2·56%	
Chinchilla	Make	1,778,964	1,245,172	323,736	207,592	2,464	34,279	34,819	96·62
	Pay	1,779,504	1,287,448	332,195	159,358	503	1·96%	2%	
Daintree	Make	118,865	118,820	45	..	..	2,724	3,191	29·87
	Pay	119,332	119,287	45	..	..	2·35%	2·75%	
Dayboro	Make	82,036	47,768	34,268	..	..	U/r. 294,578	U/r. 20,326	24·78
	Pay	362,783	319,509	43,274	..	..	..	..	
Toowoomba	Make	2,823,372	1,965,564	771,232	86,576	..	91,233	91,232	67·35
	Pay	2,823,371	1,965,985	774,604	82,782	..	3·34%	3·34%	
Clifton	Make	1,394,792	1,036,336	353,976	4,480	..	41,698	41,700	90·60
	Pay	1,394,794	1,033,983	357,037	3,774	..	3·08%	3·08%	

OFFICIAL GRADINGS IN BOXES.

Factory.	Boxes Submitted As Choice.	Grading Result.			Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		Pastry Quality.
		Choice.	First.	Second.		First.	Second.	Pastry.		Second.	Pastry.	
Atherton	4,307	4,307 100%	..	..	117	117 100%	..	..	264	264 100%	..	..
Bushy Creek ..	..	..	..	..	..	..	..	..	..	..	..	..
Caboolture ..	23,025	15,303 66·46%	7,722 33·54%	..	3,834	3,402 88·73%	432 11·27%	..	27	14 51·85%	13 49·15%	..
Eumundi	29,008	13,626 46·97%	15,382 53·03%	..	3,927	2,943 74·94%	984 25·06%	..	..	..	..	..
Pomona	20,345	15,923 78·26%	4,422 21·74%	..	1,658	1,393 84·02%	265 15·98%	..	..	..	..	..
Chinchilla	20,324	11,762 57·87%	8,531 41·98%	31 ·15%	6,609	6,116 92·54%	493 7·46%	..	3,761	3,305 87·88%	456 12·12%	.. ..
Daintree	..	..	..	..	634	..	605 95·43%	29 4·57%	..	..	..	..
Dayboro	..	..	..	..	..	..	..	..	..	..	..	..
Toowoomba ..	18,574	14,682 79·05%	3,892 20·95%	..	14,054	13,760 97·91%	294 2·09%	..	1,327	1,197 90·20%	130 9·8	..
Clifton	17,062	15,070 88·32%	1,946 11·41%	46 ·27%	7,209	7,173 99·50%	36 ·50%	..	80	80 100%	..	..

PRODUCTION, PAYMENTS, AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1946—*continued.*

Factory.	Manufacture and Payments in Lb.						Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Crow's Nest	Make	1,587,824	738,696	825,720	23,408	..	46,844	46,869	97·57
	Pay	1,587,849	737,977	827,028	22,844	..	3·04%	3·04%	
Dalby	Make	3,169,116	993,774	2,078,742	96,600	..	104,558	104,579	96·01
	Pay	3,169,137	990,587	2,096,739	81,811	..	3·41%	3·41%	
Goombungee	Make	1,950,312	1,041,264	908,320	728	..	59,104	59,096	100
	Pay	1,950,304	1,041,235	908,369	700	..	3·13%	3·12%	
Jandowae	Make	2,249,576	1,114,344	1,061,536	73,696	..	66,117	66,088	99·99
	Pay	2,249,547	1,114,539	1,061,651	73,357	..	3·03%	3·03%	
Miles	Make	1,048,992	96,488	796,768	155,736	..	30,436	30,432	86·78
	Pay	1,048,988	96,226	796,912	155,850	..	2·99%	2·99%	
Esk	Make	2,301,372	1,094,823	1,093,311	113,238	..	74,276	74,472	96·54
	Pay	2,301,568	1,090,795	1,122,635	88,138	..	3·34%	3·34%	
Evelyn Tableland ..	Make	407,904	371,840	35,672	..	392	13,013	11,568	7·06
	Pay	406,459	401,179	4,502	778	..	3·30%	2·93%	
Gayndah	Make	1,282,540	852,796	365,008	64,736	..	46,588	46,925	79·05
	Pay	1,282,877	851,876	370,544	60,457	..	3·77 %	3·80%	
Killarney	Make	1,476,794	889,903	533,005	53,886	..	27,846	27,887	82·37
	Pay	1,476,835	761,691	651,542	63,602	..	1·92%	1·92%	
Logan and Albert ..	Make	3,427,792	2,854,352	573,440	..	..	126,028	125,299	94·74
	Pay	3,427,063	2,907,015	517,759	2,289	..	3·82%	3·79%	

OFFICIAL GRADINGS IN BOXES—*continued.*

Factory.	Boxes Submitted As Choice.	Grading Result.			Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		Pastry Quality.
		Choice.	First.	Second.		First.	Second.	Pastry.		Second.	Pastry.	
Crow's Nest	12,544	9,899 78·91%	2,645 21·09%	..	14,670	14,476 98·68%	194 1·32%	..	450	450 100%	..	..
Dalby	14,572	11,618 79·73%	2,954 20·27%	..	38,025	37,844 99·52%	181 ·48%	..	1,737	1,131 65·11%	606 34·89%	..
Goombungee ..	18,357	13,393 72·96%	4,964 27·04%	..	16,954	16,792 99·04%	162 ·96%	..	74	74 100%	..	..
Jandowae	19,615	10,919 55·67%	8,627 43·98%	69 ·35%	19,279	17,360 90·05%	1,919 9·95%	..	1,274	1,033 88·08%	241 18·92%	..
Miles	400	215 53·75%	185 46·25%	..	13,191	11,620 88·09%	1,571 11·91%	..	2,664	1,650 61·94%	1,014 38·06%	..
Esk	18,398	12,617 68·58%	5,781 31·42%	..	19,390	18,823 97·08%	567 2·92%	..	1,888	1,588 84·11%	300 15·89%	..
Evelyn Tableland	429	241 56·18%	188 43·82%	..	85	85 100%	..	..	..	..	..	..
Gayndah	10,425	8,588 82·38%	1,837 17·62%	..	6,477	5,865 90·55%	612 9·45%	..	1,203	627 52·12%	576 47·88%	..
Killarney	8,826	6,373 72·21%	2,453 27·79%	..	11,790	11,645 98·77%	145 1·23%	..	1,106	1,106 100%	..	..
Logan and Albert	47,838	22,489 47·02%	25,283 52·84%	66 ·14%	10,152	8,005 78·85%	2,147 21·15%	..	..	..	..	..

PRODUCTION, PAYMENTS, AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1946—*continued*.

Factory.		Manufacture and Payments in Lb.					Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Maleny	Make	2,160,883	2,048,547	112,336	..	..	64,861	65,911	94·14
	Pay	2,161,933	2,091,921	69,424	588	..	3·09%	3·14%	
Biggenden	Make	1,627,284	1,173,684	453,600	..	..	44,481	44,120	81·00
	Pay	1,626,923	1,247,011	379,912	..	..	2·81%	2·79%	
Kingaroy	Make	3,770,332	3,260,652	324,880	184,800	..	139,048	138,415	50·86
	Pay	3,769,699	3,295,826	317,033	156,840	..	3·83%	3·81%	
Mundubbera	Make	2,096,652	1,764,180	217,504	14,968	..	82,713	82,322	82·83
	Pay	2,096,261	1,811,960	192,241	92,060	..	4·11%	4·09%	
Wondai	Make	2,291,910	1,586,565	633,640	71,705	..	78,456	78,851	78·42
	Pay	2,292,305	1,690,466	556,285	45,554	..	3·54%	3·56%	
Milmerran	Make	1,421,881	312,353	735,000	340,424	34,104	35,709	35,629	90·50
	Pay	1,421,801	368,749	755,205	297,847	..	2·58%	2·57%	
Nanango	Make	2,411,440	710,608	1,649,088	51,744	..	86,172	85,506	96·57
	Pay	2,410,774	957,077	1,419,397	34,300	..	3·71%	3·68%	
Oakey	Make	4,414,674	3,156,634	860,720	397,320	..	147,972	146,594	95·66
	Pay	4,413,296	3,216,004	885,259	312,033	..	3·47%	3·44%	
Bundaberg	Make	1,380,583	478,983	901,600	..	..	27,218	32,096	57·09
	Pay	1,385,461	446,447	938,046	945	23	2·01%	2·37%	
Gladstone	Make	935,025	136,355	770,527	28,143	..	19,341	19,713	62·42
	Pay	935,397	167,642	741,063	26,692	..	2·11%	2·15%	

OFFICIAL GRADINGS IN BOXES—*continued.*

Factory.	Boxes Submitted As Choice.	Grading Result.			Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		Pastry Quality.
		Choice.	First.	Second.		First.	Second.	Pastry.		Second.	Pastry.	
Maleny	33,756	23,617 69·96%	10,139 30·04%	..	2,571	2,410 93·74%	161 6·26%	..	..	..	..	..
Biggenden ..	15,256	8,900 58·34%	6,324 41·45%	32 ·21%	8,281	6,471 78·14%	1,790 21·62%	20 ·24%	..	..	..	..
Kingaroy	25,038	21,762 86·92%	3,276 13·08%	..	5,905	5,186 87·82%	719 12·18%	..	3,301	2,837 85·94%	464 14·06%	..
Mundubbera ..	25,085	13,143 52·39%	11,904 47·46%	38 ·15%	4,058	2,635 64·93%	1,423 35·07%	..	1,868	721 38·60%	1,147 61·40%	..
Wondai	19,729	16,179 82·01%	3,550 17·99%	..	11,155	10,060 90·18%	1,095 9·82%	..	1,211	998 82·41%	213 17·59%	..
Milmerran ..	3,380	1,909 56·48%	1,471 43·52%	..	12,903	12,211 94·64%	692 5·36%	..	6,652	5,217 78·43%	1,435 21·57%	43
Nanango	11,299	8,077 71·48%	3,222 28·52%	..	29,351	28,866 98·35%	485 1·65%	..	935	822 87·91%	113 12·09%	..
Oakey	50,922	29,408 57·75%	21,514 42·25%	..	17,398	17,275 99·29%	123 ·71%	..	7,093	7,093 100%	..	..
Bundaberg ..	867	647 74·63%	220 25·37%	..	13,207	12,689 96·08%	518 3·92%	..	..	..	..	..
Gladstone	344	315 91·57%	29 8·43%	..	9,854	9,854 100%	..	..	151	84 55·63%	67 44·37%	73

PRODUCTION PAYMENTS, AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1946—*continued.*

Factory.		Manufacture and Payments in Lb.					Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Monto	Make	3,383,701	1,267,387	1,999,166	117,148	..	54,521	65,570	92·69
	Pay	3,394,750	1,427,173	1,872,466	95,111	..	1·64%	1·97%	
Rockhampton	Make	1,206,409	147,985	924,889	133,535	..	11,362	14,645	13·24
	Pay	1,209,692	150,911	942,089	116,692	..	·95%	1·23%	
Wowan	Make	2,039,312	349,164	1,496,952	189,836	3,360	51,905	51,962	75·04
	Pay	2,039,369	350,324	1,509,322	179,723	..	2·61%	2·61%	
Biloela	Make	3,224,257	691,424	2,396,629	136,204	..	68,833	68,898	90·47
	Pay	3,224,322	677,267	2,430,409	116,646	..	2·18%	2·18%	
Q.A.H.S. and College ..	Make	72,960	44,400	27,608	952	..	1,189	1,219	39·45
	Pay	72,990	69,216	3,652	122	..	1·66%	1·70%	
Boonah	Make	3,917,121	1,566,664	2,082,705	261,200	6,552	134,763	134,620	92·59
	Pay	3,916,978	2,552,487	1,203,925	160,566	..	3·56%	3·56%	
Booval	Make	3,707,283	1,896,575	1,397,312	411,492	1,904	74,371	75,631	70·41
	Pay	3,708,543	2,022,339	1,360,963	325,241	..	2·05%	2·08%	
Grantham	Make	2,505,281	1,065,044	1,146,977	287,828	5,432	74,642	74,595	91·95
	Pay	2,505,234	1,368,321	912,068	224,845	..	3·07%	3·07%	
Laidley	Make	1,983,983	1,105,890	736,104	140,253	1,436	69,601	69,657	96·37
	Pay	1,984,040	1,232,613	639,324	112,103	..	3·64%	3·64%	
Lowood	Make	915,970	245,430	606,482	59,354	4,704	24,477	24,434	94·24
	Pay	915,927	264,370	603,199	48,358	..	2,75%	2·74%	

OFFICIAL GRADINGS IN BOXES—*continued.*

Factory.	Boxes Submitted As Choice.	Grading Result.			Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		Pastry Quality.
		Choice.	First.	Second.		First.	Second.	Pastry.		Second.	Pastry.	
Monto	16,461	13,574 82·46%	2,887 17·54%	. .	35,896	35,877 99·95%	19 ·05%	. .	2,155	1,873 86·91%	282 13·09%	28
Rockhampton . .	. .	. .	. .	. .	1,336	1,202 89·97%	134 10·03%	. .	1,590	605 38·05%	985 61·95%	. .
Wowan	2,533	1,577 62·26%	956 37·74%	. .	21,603	20,811 96·33%	792 3·67%	. .	3,262	1,523 46·69%	1,739 53·31%	. .
Biloela	8,495	6,390 75·22%	2,105 24·78%	. .	41,152	40,278 97·88%	874 2·12%	. .	2,343	1,283 54·76%	1,060 45·24%	. .
Q.A.H.S and College	4	. .	4 100%	. .	493	469 95·13%	24 4·87%	. .	17	17 100%	. .	. .
Boonah	37,097	10,070 27·15%	26,961 72·68%	66 ·17%	24,120	21,832 90·51%	2,288 9·49%	. .	3,545	3,113 87·81%	432 12·19%	. .
Booval	18,348	11,969 65·23%	6,379 34·77%	. .	22,137	20,708 93·54%	1,429 6·46%	. .	6,126	5,756 93·96%	370 6·04%	. .
Grantham . .	19,774	9,768 49·40%	10,006 50·60%	. .	16,784	15,526 92·50%	1,222 7·28%	36 ·22%	4,577	4,455 97·33%	122 2·67%	. .
Laidley	20,438	14,293 69·64%	6,145 30·36%	. .	11,498	10,712 93·16%	786 6·84%	. .	2,207	2,017 91·39%	190 8·61%	. .
Lowood	3,824	2,461 64·36%	1,363 35·64%	. .	10,706	10,164 94·94%	542 5·06%	. .	885	732 82·71%	153 17·29%	. .

PRODUCTION, PAYMENTS, AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1946—*continued.*

Factory.		Manufacture and Payments in Lb.					Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Roma	Make	637,299	..	437,155	200,144	..	19,152	19,152	47·89
	Pay	637,299	132,081	341,488	163,652	78	3·10%	3·10%	
Murgon	Make	2,378,429	1,582,467	791,034	4,928	..	75,537	74,869	83·59
	Pay	2,377,761	1,773,267	601,152	3,342	..	3·28%	3·25%	
Proston	Make	1,276,342	685,317	512,961	78,064	..	45,752	45,573	96·35
	Pay	1,276,163	746,590	462,791	66,782	..	3·72%	3·70%	
Kingston	Make	4,681,208	2,731,344	1,795,192	154,672	..	144,638	141,699	99·84
	Pay	4,678,869	2,906,610	1,657,454	114,805	..	3·17%	3·12%	
Woodford	Make	1,482,015	1,249,482	232,533	..	..	42,525	45,131	100
	Pay	1,484,621	1,278,156	206,465	..	..	2·95%	3·14%	
Allora	Make	1,604,456	1,116,666	479,524	8,266	..	38,008	38,445	83·65
	Pay	1,604,893	1,117,423	477,134	10,336	..	2·43%	2·45%	
Inglewood	Make	515,082	171,690	294,112	49,280	..	16,287	16,365	85·68
	Pay	515,160	150,377	319,726	45,057	..	3·27%	3·28%	
Mill Hill	Make	1,790,220	1,718,932	42,728	28,560	..	53,752	51,434	59·86
	Pay	1,787,902	1,203,087	551,494	33,321	..	3·09%	2·96%	
Texas	Make	181,379	122,101	23,805	35,473	..	6,738	6,711	32·91
	Pay	181,352	72,803	75,098	33,451	..	3·86%	3·84%	
Cooroy	Make	1,272,442	966,626	274,064	31,752	..	28,603	28,360	91·62
	Pay	1,272,199	1,046,745	209,002	16,452	..	2·30%	2·28%	

OFFICIAL GRADINGS IN BOXES—*continued*.

Factory.	Boxes Submitted As Choice.	Grading Result.			Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		Pastry Quality.
		Choice.	First.	Second.		First.	Second.	Pastry.		Second.	Pastry.	
Roma	. .	. .	. .	. .	1,902	1,860 97·79%	42 2·21%	. .	3,548	3,516 99·10%	32 ·90%	. .
Murgon	20,956	12,824 61·19%	8,132 38·81%	. .	14,296	13,924 97·40%	372 2·60%	. .	88	61 69·32%	27 30·68%	. .
Proston	11,476	6,079 52·97%	5,397 47·03%	. .	9,099	8,831 97·5%	268 2·95%	. .	1,386	1,255 90·55%	131 9·45%	. .
Kingston	48,337	35,511 73·47%	12,826 26·53%	. .	30,653	30,422 99·25%	231 ·75%	. .	2,690	2,588 96·21%	102 3·79%	. .
Woodford	21,962	10,275 46·79%	11,687 53·21%	. .	4,447	4,023 90·47%	424 9·53%	. .	59	59 100%	. .	. .
Allora	13,649	6,326 46·35%	7,277 53·32%	46 ·33%	10,177	9,932 97·59%	245 2·41%	. .	139	106 76·26%	33 23·74%	. .
Inglewood . .	1,996	1,073 53·76%	856 42·89%	67 3·35%	5,014	5,014 100%	. .	. .	871	817 93·80%	54 6·20%	. .
Mill Hill	16,163	14,577 90·19%	1,586 9·81%	. .	2,437	2,437 100%	. .	. .	536	451 84·14%	85 15·86%	. .
Texas	. .	. .	. .	. .	442	442 100%	. .	. .	624	537 86·06%	87 13·94%	. .
Cooroy	14,921	11,769 78·88%	3,152 21·12%	. .	5,347	5,005 93·60%	342 6·40%	. .	550	530 96·36%	20 3·64%	. .

PRODUCTION, PAYMENTS, AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1946—*continued.*

Factory.	Manufacture and Payments in Lb.						Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Gympie	Make	5,585,637	4,931,316	573,272	81,049	..	194,294	197,500	91·68
	Pay	5,588,843	5,122,921	402,918	63,004	..	3·57%	3·63	
Maryborough	Make	846,461	512,907	320,926	12,628	..	26,339	28,271	26·76
	Pay	848,393	567,622	267,067	13,704	..	3·21%	3·45%	
Millaa Millaa	Make	697,591	688,911	1,064	7,616	..	24,176	22,096	15·68
	Pay	695,511	687,698	..	7,813	..	3·59%	3·28%	
Mackay	Make	641,571	214,024	422,617	646	4,284	16,055	18,341	..
	Pay	643,857	208,557	430,340	697	4,263	2·57%	2·93%	
Silkwood	Make	7,182	..	7,182	..	..	180	188	..
	Pay	7,190	..	7,190	..	..	2·57%	2·68%	
Totals	Make	101,242,498	60,817,440	35,842,442	4,517,684	64,932	2,719,626	..	..
	Pay	101,547,523	63,895,747	33,913,042	3,733,867	4,867	..	3,018,155	

OFFICIAL GRADINGS IN BOXES—*continued*.

Factory.	Boxes Submitted As Choice.	Grading Result.			Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		Pastry Quality.
		Choice.	First.	Second.		First.	Second.	Pastry.		Second.	Pastry.	
Gympie	77,755	68,816 88·50%	8,939 11·50%	. .	12,354	11,184 90·53%	1,170 9·47%	. .	1,334	948 71·06%	386 28·94%	. .
Maryborough . .	34	24 70·59%	10 29·41%	. .	3,887	3,339 85·90%	523 13·46%	25 ·64%	124	10 8·06%	114 91·94%	. .
Millaa Millaa . .	999	999 100%	. .	. .	829	829 100%	. .	. .	125	95 76·00%	30 24·00%	. .
Mackay	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Silkwood	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Totals . .	824,947 . .	549,357 66·59%	275,129 33·36%	461 ·05%	589,347 . .	559,897 95·00%	29,340 4·98%	110 ·02%	75,847 . .	62,638 82·58%	13,209 17·42%	144 . .

Grading Results: Choice—549,357 boxes, 36·86%; First—835,026, 56·03%; Second, 92,439, 6·21%; Pastry, 13,463, ·9%.

CORRECTED YIELDS AND GRADES OF CHEESE FOR TWELVE MONTHS ENDED 30TH JUNE, 1946.

Factory.	Milk. Received.	Production and Yield.						Gradings of Cheese.			
		Green Cheese, Weight.	Butterfat.	Cheese. Yields. *Per 100 Lb. Milk.	Cheese. Yields. Per Lb. Butterfat.	Average Test.	Total Submitted.	Choice.	First.	Second.	Third.
	Lb.	Lb.	Lb.	Per cent.	Per cent.	Per cent.	Lb.				
Coalstoun Lakes	1,731,307	164,126	65,300	9·48	2·51	3·77	16,047	..	..	7,536 46·96%	8,511 53·04%
Felton	6,117,051	674,770	244,538	11·03	2·76	3·64	371,315	..	328,464 88·46%	42,851 11·54%	..
Highgrove	2,631,611	271,719	101,379	10·32	2·68	3·85	217,212	..	1,890 ·87%	191,014 87·94%	24,308 11·19%
Irongate	5,695,035	572,344	206,755	10·05	2·77	3·89	511,068	2,101 ·41%	471,409 92·24%	36,118 7·07%	1,440 ·28%
Pittsworth	9,691,280	1,022,414	387,236	10·55	2·64	4	708,139	79,255 11·19%	604,502 85·37%	24,382 3·44%	..
Brookstead	3,130,894	330,925	121,631	10·57	2·72	3·88	330,901	..	236,159 71·37%	93,305 28·2 %	1,437 ·43%
Linthorpe	4,975,044	515,295	193,861	10·23	2·63	3·90	397,689	..	198,917 50·01%	195,757 49·23%	3,015 ·76%
Scrubby Mountain	3,650,781	371,283	140,837	10·17	2·64	3·86	360,990	..	83,691 23·18%	264,579 73·29%	12,720 3·53%
Springside	3,990,870	440,278	149,416	10·27	2·74	3·74	342,674	118,040 34·45%	223,671 65·27%	963 ·28%	..
Yarranlea	5,730,306	584,432	216,404	10·20	2·70	3·70	363,048	588 ·16%	319,273 87·94%	41,910 11·55%	1,277 ·35%
Rockview	2,829,866	295,536	110,921	10·44	2·66	3·92	278,786	1,607 ·58%	257,850 92·49%	19,329 6·93%	..
Yamsion	3,708,299	425,047	150,179	11·46	2·83	4·05	399,183	..	209,218 52·41%	185,403 46·45%	4,562 1·14%
Yargullen	4,321,884	459,805	167,644	10·64	2·74	3·88	344,800	..	305,222 88·52%	39,114 11·34%	464 ·14%
Maxam, Cooranga North	6,683,158	724,168	272,439	10·84	2·66	4·08	687,176	..	613,829 89·33%	73,347 10·67%	..
Maryborough, Wondai	1,145,203	104,497	44,694	9·12	2·34	3·90	48,386	..	48,386 100%	..	..
Amended Totals	262,342,479	26,943,245	10,017,301	10·26	2·69	3·87	18,308,511	229,807 1·26%	12,633,939 69·01%	5,176,917 28·28%	267,849 1·45%

ANIMAL HEALTH

Veterinary Medicines.

F. B. COLEMAN, Registrar of Veterinary Medicines.

VETERINARY medicines under "*The Veterinary Medicines Acts*, 1933 *to* 1938," include any mixture, compound, or preparation of one or more drugs or ingredients in any form or any biological products, including both living and dead vaccines, sera, and diagnostic agents intended to be administered to stock by any means:

(*a*) For the purpose of curing or alleviating any injury to stock,

(*b*) For the purpose of curing or preventing any disease of any stock,

(*c*) For the purpose of improving the condition of or increasing the capacity of any stock for work or production or show purposes.

The term does not include—

(i.) Any drug or drugs actually prescribed by a veterinary surgeon in the course of the practice of his profession as such,

(ii.) Any veterinary medicine or medicament or material supplied by a veterinary surgeon for any stock for the time being under his professional care or charge.

Every dealer in veterinary medicines must hold a license to sell such preparations. The prescribed license fee is 5s. which is payable in January of each year and/or when commencing business.

Before any veterinary medicine is placed upon the Queensland market, an application for registration must be made and such application renewed every three years, i.e., 1948, 1951, &c., during the month of January. Registration fees are payable annually. No sales should take place until registration has been effected.

Application for registration or renewal thereof involves the forwarding of a statutory declaration, setting out the formula of the preparation, accompanied by a specimen label and sample, and the necessary fees, i.e., £1 1s. for the first preparation, and 5s. for each subsequent veterinary medicine, with a maximum of £5 5s. per year. These applications are duly examined with respect to the Act's requirements and placed before the Veterinary Medicines Board—consisting of the Agricultural Chemist, the Chief Inspector of Stock, a bacteriologist, and a veterinary surgeon.

The formulae, claims, and statements made are considered, and, if approved, the veterinary medicine, upon completion of all the Act's requirements, is duly registered.

All labels are required to set out the following:—

(*a*) The distinctive name of the veterinary medicine;

(*b*) The net weight contained in the package, or, in the case of liquids, the true volume content expressed in Imperial measure;

(*c*) In the case of any liquid veterinary medicine having or claiming to have germicidal and/or disinfecting properties, its bactericidal efficiency expressed in terms of absolute phenol (100 per cent.) as determined by the Rideal-Walker test;

(*d*) A printed statement giving quantity or proportion of any substance or substances prescribed in the Second Schedule of the Regulations.

(*e*) In the case of biological products, in addition to the other requirements of the Regulations, the date from which they should no longer be used; this must be expressed in the following manner:—

"Kept in a dark, cool place, this product remains fully potent until [*Here insert date*].

(*f*) The name and address of the Queensland primary dealer or manufacturer;

(*g*) All directions for use of the veterinary medicine;

(*h*) The following wording:—

"Registered under the *Queensland Veterinary Medicines Acts*";

(*i*) The word POISON when required.

All veterinary medicines containing *Carbon tetrachloride, Tetrachlorethylene, and Trichlorethylene,* must be labelled "Poison" and packed in the manner prescribed by Regulation 15 under the *Veterinary Medicines Acts.*

The word "POISON" should be in red letters on a white ground, in larger and heavier type than any other letter on the label; and no other word shall appear on the same line. No other letter on the label shall be in a red colour.

Farmers and other buyers would be well advised **never to accept delivery** of any veterinary medicine unless it has affixed to the package a plainly printed label setting out the required information.

In the absence of a label it is obvious that the buyer should at once communicate with the Standards Branch, Department of Agriculture, William Street, Brisbane.

The *Veterinary Medicines Acts* provide that no person shall affix any label to or use or issue with or in connection with any veterinary medicine offered for sale directions for use, or any printed, typed, or written matter, and/or advertisement which contains any statement or claim which directly or by implication indicates or suggests that it will prevent or cure the following diseases:—

Malignant growths (cancer), tuberculosis, or contagious abortion.

The veterinary medicines as set out in the following list are those that have been registered for the three-year period January, 1945, to December, 1947, under the above Acts. These and any published in subsequent lists are the only veterinary medicines that should be offered for sale or requested by prospective purchasers.

It should be noted that the sale of any unregistered veterinary medicine would render the seller liable to a penalty not exceeding £20.

Veterinary Medicines Registered for the period January, 1945, to December, 1947.

List No. 1 prepared on 19th July, 1946, and published in accordance with section 6 (7) of the Acts.

A.C.F. & Shirleys Fertilizers Ltd., Little Roma street, Brisbane.

Andrew Dryden's Diuretic Powders for Horses and Cattle.
Andrew Dryden's Embrocation.
Andrew Dryden's Gripe Drench.
Andrew Dryden's Wound Dressing for Horses and Cattle.
Andrew Dryden's Condition Powders for Horses and Cattle.
Dryden's Gall Cure.
Dryden's Invaluable Specific for Warts on Poultry.

Armitstead, J., Chemist, Warwick.

Mawson's Sheep Tapeworm Drench.

Australian Chemical Co. Ltd., Donkin street, South Brisbane.

Acco Savol.

Australian Disinfectant Co., 150 Mary street, Brisbane.

Novama for Control of Vaginitis.
Safonia.
Wagstaff's Stock Drench.
Wagstaff's Embrocation.

Baynes, J. H., 297 Ruthven street, Toowoomba.

Pro-Vet Antiseptic Capsules.
Pro-Vet Black Spot Application.
Pro-Vet Blighty.
Pro-Vet Bloat Draught.
Pro-Vet Bot Bombs.
Pro-Vet Calcium Drench.
Pro-Vet Condition Powder.
Pro-Vet Embrocation.
Pro-Vet Foot-Rot Paste.
Pro-Vet Laxative Drench.
Pro-Vet Mange Specific.
Pro-Vet Stock Drench (Concentrated).
Pro-Vet Physic Balls for Horses.
Pro-Vet Salve.
Pro-Vet Scour Treatment.
Pro-Vet Udderlin.
Pro-Vet Vaginitis Powder.
Vermort Sheep Drench.
Hamilton Mammitis Vaccine.
Pro-Vet Blackleggine.
Provet-ol.
Provetine.
Pro-Vet Hamilton Drench.

Bickford & Sons Ltd. A. M., Tank street, Brisbane.

Radiol Leg Wash Powder.
Radiol Chemical Liquid.

Bryce Ltd., 134 Adelaide street, Brisbane.

Pegasol.
Pegasus Blackleg Aggressin (Liquid).
Pegasus Mammitis Toxiculture.
Pegasus Stock Drench (Concentrated).
Pegasus Vaginitis Capsules.
Pegasus Worm Drench for Horses.

Butler & Co. Pty. Ltd., E., 432 Queen street, Brisbane.

Hagley's Hopple Chafe Specific.

Campbell Bros. Pty. Ltd., Campbell street, Bowen Hills, Brisbane.

Safa.

Carvosso, P. H., 28 Wienholt street, Auchenflower, Brisbane.

Chemco Dog Condition Powders.
Bot Capsule.

Dalgety & Co. Ltd., Elizabeth street, Brisbane.

Kerol.
Sayers Blu-Nik.

Davey, Mrs. M. E., Prospect street, Wynnum.

Moases Famous Antiseptic Disinfectant Deodorant.
Moases Famous Draught for Horse or Cow for Colic.
Moases Famous Drench for Cattle.
Moases Famous Eye Specific.
Moases Famous Liniment.

David, F. D., George street, Brisbane.

K Nine Puppy Worm Syrup.
K Nine Canker Lotion.
K Nine Nu Kote Mange Prescription.
Fleego Dog Soap.
David's Ear Canker Powder.
David's Worm Mixture for Grown Dogs.
Rid-O-Mange.

Dryden, V., 10 Fuller street, Lutwyche, Brisbane.

Gall Ointment.
Victor Dryden's Blood and Water Powders for Horses.
Victor Dryden's Embrocation for Horses and Cattle.
Victor Dryden's Gripe Drench for Horses and Cattle.
Victor Dryden's Liquid Blister for Horses and Cattle.
Victor Dryden's Poultry Specific for Warts.
Victor Dryden's Scour in Calves.
Victor Dryden's Wound Dressing for Horses and Cattle.
Victor Dryden's Worm and Condition Powders.

Goldsborough Mort & Co. Ltd., 63-71 Eagle street, Brisbane.

Harton Arsenical Sheep Drench.
Wurm-Ez-Ol Sheep Drench.
Carbene Sheep Drench.
Cee-Tee-Cee Sheep Drench.
To-Cu-Sul Sheep Drench.
Too-Partz Sheep Drench.
Taipo Sheep Drench.

Gollin & Co. Pty. Ltd., 70-72 Eagle street, Brisbane.

Meggitt's Pure Medicinal Linseed Oil.

Green & Rawkins, Flinders street, Townsville.

Wonderdog Purgative Pills.
Wonderdog Diuretic Pills.
Wonderdog Condition Powders.
Wonderdog Skin Lotion.
Wonderdog Greyhound Tonic.
Wonderdog Vitatone.
Wonderdog Puppy Worm Syrup.
Wonderdog Tonic Tablets.
Wonderdog Ear Canker Powder.
Wonderdog Worm Powders.
Wonderdog Special Formula Powders.
Wonderdog Cough Mixture.

Happidog Store Pty. Ltd., 450 Queen street, Brisbane.

Happidog Canker Lotion.
Happidog Skin Lotion.
Happidog Eczema Lotion.
Happidog Eye Ointment.
Happidog Alterative Powder.
Happidog Worm Capsule.
Happidog Worm Powder.
Happidog Worm Syrup.
Happidog Pad Lotion.
Happidog Condition Powder.
Happidog Antiseptic Lotion.

Harveyson, T. C., Dorrington Drive, Ashgrove, Brisbane.

"Wellcome" Calcium Borogluconate.

Hayes Veterinary Co., 351 Queen street, Brisbane.

Havcol.
Hayes' Barbed Wire Liniment.
Hayes' Cattle Blight Powders.
Hayes' Cleansing Drench.
Hayes' Condition Powders.
Hayes' Mange Ointment.
Hayes' Scour Powders.
Hayes' Udder Ointment.
Hayes' Wart Lotion.
Yohimbin.
Hayes' Veterinary Ointment.

Imperial Chemical Industries of Aust. & N.Z. Ltd., 108 Creek street, Brisbane.

Phenovis Powder.

Maclean Pty. Ltd., D., Charlotte street, Brisbane.

Baxters Alterative Mixture.
Baxters Skin Lotion.
Baxters Husk Mixture.
Baxters Puppy Worm Syrup.
Baxters Red Tonic.
Baxters Worm Powder for Dogs.
Judges Special Tasteless Horse Laxative.
Judges Blight Powder.
Judges Purple Paint.
Judges Vaginitis Powder.
Judges Nasal Ointment.
Judges Foot Rot Powder.
Judges Scarlet Blister.
Judges Cough and Cold Remedy.
Judges Condition Powder.
Judges Dairy Drench.
Judges Dairy Ointment.
Judges Blight Lotion.
Judges Scour Powder.
Judges Vaginal Pessaries.
Judges Vettoll.
Judges Veterinary Embrocation.
"Judsol."
Vitaforce Greyhound Tonic.
Judges Wart Ointment.

Mactaggarts Primary Producers Co-op. Assn. Ltd., Eagle street, Brisbane.

Mactaggart's Carbol.
Equinoint.
Mactaggart's Medicated Speying and Dehorning Stockholm Tar.
"Max-Tar" Dehorning Dressing.

McDonald & Co., A. H., 99-103 Mary street, Brisbane.

Vetamac Foot Rot Treatment.
Vetamac Pig Drench.
Vetamac Fluke Drench.
Vetamac Fluke and Worm Specific.
Vetamac Antiseptic Capsules.
Vetamac Vaginitis Remedy.
Vetamac Ointment.
Vetamac Antiseptic.
Vetamac Bluestone Nicotine Drench.
Vetamac Pink Eye Powder.
Vetamac Tapeworm Drench.
Vetamac A.B.C. Sheep Drench.
Vetamac Embrocation.
Vetamac Iodine.
Vetamac Calcium Drench.
Calcium Borogluconate.
Vetamac Phenothiazine Emulsion.
Vetamac Stock Drench.

Mitchell, K., 95-97 Eagle street, Brisbane.

Barko Alterative Mixture.
Barko Ear Powder.
Barko No. 1 Mixture.
Barko Ear Lotion.
Barko Eye Lotion.
Barko Eye Ointment.
Barko Iodine Dog Soap.
Barko Pad Paint.
Barko Skin Lotion.
Barko Tonic Food.
Barko Worm Powders for Dogs.
Barko Condition Powders.

Morden Laboratories, 66 Charlotte street, Brisbane.

Morden Diarrhoea Mixture for Poultry.
Morden Catarrh Mixture for Poultry.
Morden Cough Mixture for Dogs.

New Zealand Loan & Mercantile Agency Co. Ltd., Eagle street, Brisbane.

Coopers Improved Worm Tablets.
Zealone A.H.P. Sheep Drench for Worm and Fluke.
Coopers Antiseptic Powder.
Coopers Liquid Worm Remedy for Puppies and Dogs.
Phenovine.
Coopers Condition Powders.

Noble & Gegg, W. A., Ruthven street, Toowoomba.

Nobles Aperient Pills for Large Dogs.
Nobles Aperient Pills for Small Dogs.
Nobles Blight Lotion for Cattle, Horses and Sheep.
Nobles Cleansing and Tonic Dairy Drench.
Nobles Colic and Gripe Drench.
Nobles Dairy Ointment.
Nobles Dog Alterative.
Nobles Non-Irritant Fluid Blister.
Nobles Physic Balls for Horses and Cattle.
Nobles Scour Remedy for Calves.
Nobles Tonic Alterative and Condition Powders for Horses.
Nobles Vettoll.
Nobles Worm and Condition Pills for Large Breeds.
Nobles Worm and Condition Pills for Small Breeds.
Nobles Worm Specific for Puppies.
Nobles Wart Ointment for Poultry.
Nobles Dog Condition Powder.
Nobles No. 11 Worm Capsules.
Nobles Worm and Physic Balls for Horses.
Nobles Powder for Vaginitis.
Nobles Canker Lotion.
Nobles Lavender Paint.
Nobles Pink Powder for Blight.

Nobles Pty. Ltd., Eagle street, Brisbane.

Contagious Vaginitis Ointment.
Sykes's Abortex.
Sykes's Animal Colic Remedy.
Sykes's Animol.
Sykes's Creatol.
Sykes's Drench.
Sykes's Farm and Home Embrocation.
Sykes's Germ Killer.
Sykes's Bag Balm.

Norris Agencies Ltd., 639 Ann street, Brisbane.

C.N. Coro-Noleum 25%.
Sidolia.

Nyal Co. (A. Light, Rep.), G.P.O., Box 423 F., Brisbane.

Krect Condition Powders.
Krect Condition Tablets.
Krect Laxative and Stomach Tablets.
Krect Mange Lotion.
Krect Puppy Worm Syrup.
Krect Worm Capsules.
Krect Dog Ointment.

O'Reilly, R., Sparkes Avenue, Hamilton.

Nema Worm Capsules.
Equine Cough Syrup (Veterinary)
Kamala.
Arecoline Hydrobromide.

Osmond & Sons Pty. Ltd., Stanley street, South Brisbane.

Bronkos.
Osmond & Sons Lincolnshire Red Draught.
Osmonds Antiseptic Pessaries.
Osmonds Bot Capsules.
Osmonds Brown Draught.
Osmonds Cattle Oils.
Osmonds Cattle Shampoo.
Osmonds Compound Santonin Worm Powders.
Osmonds Worm Drench and Fluke Kill (Single Strength).
Osmonds Worm Drench and Fluke Kill (Double Strength).
Osmonds Foot Rot Paste.
Osmonds Pig Powders.
Osmonds Saltona Condition Salt.
Osmonds Special Scour Cordial.
Osmonds Special Worm Drink for Horses.
Osmonds Vaccadyne.
Osmonds White Oils.
Osmonds Fluid Zenos Disinfectant.
Osmonds Concentrated Ovolis.
Osmonds Vitaline.
Osmonds Aphrodisaic Powder.
Osmonds Chlorosyl.
Osmonds Grease Wash.
Osmonds Restoral.
Osmonds Physic Balls.
Osmonds Nikop.
Osmonds Hooseiline.
Osmonds Ethodyne.

Pennefather, E. K., 39 Tower street, Albion Heights, Brisbane.

Golden Egg Fowl Pox Vaccine (Attentuated).

Poultry Farmers Co-op. Soc. Ltd., Roma street, Brisbane.

Healo.
Red Comb Fowl Pox Vaccine (Attenuated).
Red Comb Scaly Leg Ointment.
Red Comb Vaginitis Powder.
Red Comb Worm Capsules.
Red Comb Nicotine Sulphate "40."
Red Comb Condition Powders.

Queensland Chemical Distributing Co., The, 107 Eagle street, Brisbane,

Vetrolene.

Queensland Pastoral Supplies Ltd., Bowen street, Brisbane.

"Hibiscus" Nicotine Sulphate.

Riddell, R. A., Rome street, Yeronga, Brisbane.

Istin.
Nemural.
Veridan.
Ascaridol.
Carbo-Pulbit.
Pellidol Ointment.
Omnadin.
"Aricyl."

Robinson & Bott Pty. Ltd., 459 Adelaide street, Brisbane.

Rawleigh's Colic and Bloat Ease.
Rawleigh's Veterinary Application.

Roush, E. A., 45 Queen street, Brisbane.
Electron Worm Killer for Poultry.
Chemist Roush Condition Powders for Dogs.
Chemist Roush Mange Lotion.
Chemist Roush Puppy Worm Syrup.
Chemist Roush Worm Capsules for Dogs (A).
Chemist Roush Worm Capsules for Dogs (B).
Chemist Roush Eye Roup Drops for Poultry.
Chemist Roush Scaly Leg Ointment for Poultry.
Chemist Roush Ear Drops for Dogs.
Chemist Roush M.N.B. Tablets for Dogs.
Chemist Roush Dog Tonic.

Salmond & Spraggon (Aust.) Pty. Ltd., 499 Adelaide street, Brisbane.
Bob Martin's 92 Ointment.
Bob Martin's Condition Powders.
Bob Martin's Worm Tablets.
Bob Martin's Worm Powders.
Elliman's Royal Embrocation for Horses and Cattle.
"Tibs" Cat Powders.

Sharkey, S. B. V, 168 Shakespeare street, Mackay.
Sharkey's Hobble Chafe Lotion.

Shaw, H. G., King House, Queen street, Brisbane.
Tilley's Timid Joe Dog Soap.

Spedosol Supply Co., Box 1483V., G.P.O., Brisbane.
Spedosol Powder.

Stephan, C. A., 201 Sandgate road, Albion, Brisbane.
Eurythmic Healing Lotion.

Surgical Supplies Ltd., Queen street, Brisbane.
Bio Blackleg Aggressin.
Bio Blackleg Toxiculture.
Bio Pleuro Virus.
Bio Strangles Toxiculture.
Bio Blackleg Solid Aggressin.
Dr. Metcalfe Sharpe's Application.
Sapocarb.
Sexine.
Surgical Supplies Blister.
S.S. Blight Powder.
S.S. Lung Worm Specific.
S.S. Scour Cure.
Wart and Horn Solvent.
Bio Flatulent Colic Drench.
Bio Special Colic Drench.
Bio Absorbine (Liquid).
Bio Fowl Pox Vaccine.
Bio Soothing Liniment.
Stewart's Bio Royal Embrocation.

Taylors Elliotts Pty., Ltd., 150 Charlotte street, Brisbane.
Austral Aloetic Physic Ball.
Austral Diuretic Drench.
Austral Cooling Lotion.
Austral Dairy Ointment.
Austral Dusting Powder.
Austral Gripe Drench.
Austral Horse Blister.
Austral Iodine Capsules.
Austral Lung Worm Drench.
Austral Pig Cough Powder.
Austral Pig Purgative Powder.
Austral Scour Drench.
Austral Trypan Blue.
Austral Vaginal Pessaries.
Doyle's Laryngine.
Reducine.
Skinner's Drench.
Weaver's Sheep Drench.
Austral Canker Ointment for Dogs.
Austral Cold and Fever Mixture for Dogs.
Austral Green Liniment for Dogs.
Austral Mange Lotion for Dogs.
Austral Puppy Worm Syrup.
Austral Tonic Powders for Dogs.
Austral Worm Capsules for Dogs.
Austral Barb Wire Embrocation.
Austral Caustic Stick.
Austral Purgative Drench.
Austral Gall Ointment.
Austral Liquid Blister.
Austral Pig Worm Powders.
Austral Regulating Drench.
Austral Ringworm Ointment.
Austral Vaginal Douche Powders.
Austral Veterinary Embrocation.
Austral Wart Paint.
Austral Condition Powders.
Cupiss Tonic Powders.
Cupiss Aromatic Physic Balls.
Cupiss Constitution Balls.
Dog Constitution Capsules.
Evans Pirevan.
Elliotts Mulgar.
Elliotts Worego.
Elliotts Coolabar.
Elliotts Brolgar.
Elliotts Galar.
Elliotts Backus.
Elliotts Prenzeen.
Skinner's Ointment.
"Cylol."

Tudor & Petty, H. G., Russell street, Toowoomba.
Vaginitis Powder.

United Chemicals Pty. Ltd., Montague road, South Brisbane.
Germacol.
United Fluke and Worm Drench.
United Medicated Stockholm Tar.
United Nicotine Sulphate—Bluestone Worm Drench.

Wilcox Mofflin Ltd., Barry Parade, Brisbane.

Cesto Tape Worm Drench.
Wilmo Enema Solution.
Red Spot Double Strength Carbon Tetrachloride Drench.
Tetralene.
Tri Kos Concentrated Sheep Drench.
Wilmolene.
Nikosul.
Tri Kos (Nicotine Sulphate and Copper Sulphate—Separate Ingredients).
B.A.H. Sheep Drench.

Wilkinson (Nth.) Pty. Ltd., L. A., Lower Ann street, Valley, Brisbane.

Wilkinson's Worm Capsules for Dogs and Puppies.
The L.P. Barb Wire Embrocation.
Wilkinson's Canker Lotion for Dogs.
Wilkinson's Dog Tonic.
Wilkinson's Laxative Dog Syrup.
Wilkinson's Mange Lotion for Dogs.
Wilkinson's Worm Syrup for Dogs.

Williams, F. 25 Cordelia street, South Brisbane.

Non-pareil Powerful Germicidal Fluid Cleanser.

INDEX OF BRANDS OR TRADE NAMES.

Brand or Trade Name.	Primary Dealer.
Acco	Australian Chemical Co. Ltd.
Andrew Dryden's	A.C.F. & Shirleys Fertilizers Ltd.
Austral	Taylors Elliotts Pty. Ltd.
Barko	Mitchell, Kenneth.
Baxter's	Maclean Pty. Ltd., D.
Bayer	Riddell, R. A.
Bio	Surgical Supplies Ltd.
Bob Martin's	Salmond & Spraggon (Aust.) Pty. Ltd.
Chemco	Carvosso, P. H.
Chemist Roush	Roush, E. A.
Cooper's	New Zealand Loan & Mercantile Agency Co. Ltd.
Cupiss	Taylors Elliotts Pty. Ltd.
David's	David, F. D.
Doyle's	Taylors Elliotts Pty. Ltd.
Dryden's	A.C.F. & Shirleys Fertilizers Ltd.
Dryden's	Victor Dryden.
Electron	Roush, E. A.
Elliman's	Salmond & Spraggon (Aust.) Pty. Ltd.
Elliotts	Taylors Elliotts Pty. Ltd.
Eurythmic	Stephan, C. A.
Evans	Taylors Elliotts Pty. Ltd.
Fleego	David, F. D.
Golden Egg	Pennefather, E. K.
Hagley's	Butler & Co. Pty. Ltd., Ed.
Hamilton	Baynes, J. H.
Happidog	Happidog Store Pty. Ltd.
Harton	Goldsbrough Mort & Co. Ltd.
Hayes'	Hayes Veterinary Co.
Hibiscus	Queensland Pastoral Supplies Pty. Ltd.
Judges	Maclean Pty. Ltd., D.
K-Nine	David, F. D.
Krect	Nyal Co., Representative, Light, A.
Mactaggart's	Mactaggarts P.P. Co-op. Assn. Ltd.
Mawson's	Armitstead, J.
"Max-Tar"	Mactaggarts P.P. Co-op. Assn. Ltd.
Meggitt's	Gollin & Co. Pty. Ltd.
Moase's	Davey, Mrs. M. E.
Morden	Morden Laboratories.
Nema	Parke Davis & Co., Representative, O'Reilly, R. deV.
Nobles	Noble & Gegg, W. A.
Non-Pareil	Williams, F
Osmonds	Osmond & Sons Pty. Ltd.
Pegasus	Bryce Ltd.
Pro-Vet	Baynes, J. H.
Radiol	Bickford & Sons Ltd., A. M.
Rawleighs	Robinson & Bott Pty. Ltd.

INDEX OF BRANDS OR TRADE NAMES—continued.

Brand or Trade Name.	Primary Dealer.
Red Comb	Poultry Farmers Co-op. Soc. Ltd.
Sayers	Dalgety & Co. Ltd.
Sharkey's	Sharkey, S. B. V.
Sidolia	Norris Agencies Ltd.
Skinner's	Taylors Elliotts Pty. Ltd.
Spedosol	Spedosol Supply Co.
S.S.	Surgical Supplies Ltd.
Stewart's	Surgical Supplies Ltd.
Stockaid	Queensland Pastoral Supplies Pty. Ltd.
Sykes's	Nobles Pty. Ltd.
"Tibs"	Salmond & Spraggon (Aust.) Pty. Ltd.
Tilley's	Shaw, H. G.
United	United Chemicals Pty. Ltd.
Vermort	Baynes, J. H.
Vetamac	McDonald & Co., A. H.
Victor Dryden's	Dryden, Victor.
Vitaforce	Maclean Pty. Ltd., D.
Vita-Lick	Goldsbrough Mort & Co. Ltd.
Wagstaff's	Australian Disinfectant Co.
'Wellcome"	Harveyson, T. C., Representative, Burroughs Wellcome.
Weaver's	Taylors Elliotts Pty. Ltd.
Wilkinson's	Wilkinson (Nthn.) Pty. Ltd., L. A.
Wonderdog	Green & Rawkins.
Zealone A.H.P.	New Zealand Loan and Mercantile Agency Co. Ltd.

Plate 140.

A Palm Grove at Granadilla, North Queensland.

MARKETING

The Dairymen's State Council.

H. S. HUNTER, Director of Marketing.

THE Queensland Dairymen's State Council is the first primary producers' statutory organization, as distinct from a marketing board, to be set up in this State since the reconstruction of the Queensland Primary Producers' Organization brought about by the 1926 and 1938 Amendments of *The Primary Producers' Organization and Marketing Acts.* The original statutory organization, which was set up under *The Primary Producers' Organization Act of* 1923, embraced, on a geographical basis, all primary producers irrespective of the commodity with which they were associated. The objects of this measure were, however, not fully achieved. The organization degenerated into a series of pressure groups and consequently it ceased to be effective.

One of the principal reasons for the ineffectiveness of the old statutory organization was that producers having interests in common were not grouped, as has always been the case with the Queensland Cane Growers' Council, a statutory body which, by contrast, has been quite successful.

This weakness was early recognized and was partly corrected by the 1926 amendment of the *Primary Producers' Organization and Marketing Acts,* which modified the set-up of the old Council of Agriculture, constituted entirely on a geographical basis, and gave it a new constitution whereby all commodity boards were represented. However, it was only a partial or compromise re-organization, since the nine districts of the State proclaimed under the original legislation retained representation on the Council, notwithstanding that the old district councils had been abolished by the amendment.

In due course, the organization was completely reconstructed on a commodity basis by the 1938 amendment to the Acts. By this amendment, the old conception of a purely geographical primary producers' organization was abandoned and the Council of Agriculture was reconstituted on a 100 per cent. commodity basis in addition to Government representation.

Coincident with this re-organization, the amending Act conferred additional powers on the commodity marketing boards. The amendment provided that, in addition to its marketing powers, a board should be concerned with the preservation, expansion, and economic well-being of the industry which it represents and should be a medium of communication between the Government or, as the case may be, the Council of Agriculture, and all engaged in or associated with such industry. Each board was also charged with the duty of taking cognizance of agricultural as well as marketing problems arising out of or associated with its particular industry.

Powers of Commodity Boards.

Specific powers given to commodity boards under the 1938 Amendment included the following:—"Generally doing all such things and taking all such steps as may from time to time be approved for the protection, advancement, or furtherance of the industry in respect of which it was constituted and/or of the producers engaged in that industry." It is therefore within the province of a marketing board to set up a field organization or to take such other measures as it considers necessary to give individuals engaged in the industry a means of expressing themselves through a mouthpiece for the industry.

That type of rank-and-file organization under the auspices of a marketing board is, however, not applicable to the dairy industry for the reason that marketing boards set up for butter and cheese are representative of the producers of butter and cheese, i.e., the butter and cheese factories, and not of the rank and file of dairymen. Furthermore, the dairy industry covers a fairly wide field of activity in which more than one marketing board is concerned, e.g., Butter, Cheese, and Milk Boards. Because of these peculiarities of the dairy industry, the organization of the rank and file has been given effect through another provision of the Acts (Section 30) which applies to the sugar industry, and, for the reasons mentioned, this method of organization for the dairy industry is not to be regarded as a precedent for adoption by other primary industries which have commodity boards set up for the marketing of their products and which are directly representative of the famers themselves.

The Constitution of the Queensland Dairymen's Organization.

The constitution of the new Queensland Dairymen's Organization under Section 30 is a departure to some extent from the Queensland Cane Growers' Council, on which it has been modelled, in that there is no parallel association of its functions with the operation of a factory as is the case with the mill suppliers' committees which are the Queensland Cane Growers' Council's counterparts of the local dairymen's committees.

The various organizations within the dairy industry will note that this situation is not without its risks, as it would be possible for the various bodies representing dairying to become divided on points of view and consequently the industry would not be able to speak with one voice on vital matters.

The constitution of the Dairymen's State Council was the second step towards the setting up of a statutory dairymen's organization. A commencement was made by electing representatives of the dairymen to serve on district dairymen's councils, and these councils have now in turn elected representatives to a central organization.

It should not be overlooked, however, that the whole organization rests on the foundation of local dairymen's committees. Because of practical and legal difficulties, a commencement in setting up the organization was made by electing the district dairymen's councils.

The constitution of the organization provides that—

> "The Queensland Dairymen's State Council may from time to time declare any part of Queensland to be an area for the purpose of establishing therefor a Local Dairymen's Committee and may from time to time abolish, subdivide, or alter the boundaries of any such area or amalgamate two or more of such areas."

The activities of the whole organization as a statutory body will have to conform to conditions prescribed by regulation.

This recently-established Queensland Dairymen's Organization now takes its place within the statutory agricultural organization of the State. Consequently, it will have duties and functions to perform in its own right within the general framework of that organization.

The main function confronting the new dairymen's statutory body is associated with the welfare of the industry generally and, in particular, the welfare and efficiency of the industry in its local areas. It is important, therefore, that the organization should build upon a solid foundation of efficient and virile-functioning local dairymen's committees.

It will be the first function of the Dairymen's State Council to define local areas and set up therein the prescribed local committees. Future elections in the organization will proceed from the Local Committee level through the District Council to the State Council.

MORE MILK MEANS HEALTHIER PEOPLE.

A well-known medical man told a team of butter factory workers, and others interested in the dairy industry, recently that Australia produces the best milk and butter in the world. He was talking on the importance of milk in the national diet. Our cattle are grass fed in the paddock, and that is better, he said, than stall feeding for quality production. Unfortunately, however, even though we do produce the best milk under the freest fresh air and sunshine conditions, we do not drink enough of it. In fact, Australians drink less milk than the people of most other countries which are said to possess an advanced civilisation. As a matter of fact Australians drink less than half a pint of milk per person per day, as compared with three-quarters of a pint per person per day swallowed by Canadians and their neighbours in the United States. Even the people of Britain drink more milk than we do, in spite of the serious shortage of dairy products they have had to put up with during the past seven years. The people of the Old Country, apparently, are still "on the bucket" while we seem to have weaned ourselves off it.

Milk to-day is of much higher quality than it used to be, thanks to the efforts of many dairy farmers who know the value of sound dairy practice in all its aspects (especially in the milking shed), in association with dairy advisers and veterinary officers, and of course, the Department of Health. Australia leads the world in regard to pure food regulations, the doctor told his audience, adding that there is no finer investment than putting clean milk into babies. Then he went on to say that "there is something wrong with our intelligence when we spend millions and millions a year on beer and only a modicum of that amount on milk. Milk is more important than meat or bread or beer and the sooner Australians wake up to that fact the better it'll be for our children."

Probably no one will dispute the wisdom of the doctor's contention that healthy citizens are the best asset a nation can have—and that more milk means a healthier people.

GENERAL NOTES

Milk and Cream Pasteurization Plants at Warwick and Innisfail.

Orders in Council have been issued under *The Milk Supply Act of* 1938 authorizing the Warwick Co-operative Dairy Association, Limited, of Warwick, and the Millaa Millaa Central Tableland Co-operative Butter Association, Limited, of Millaa Millaa, to establish and carry on pasteurization plants at Warwick and Innisfail, respectively, and to supply pasteurized milk and cream within the areas of the city of Warwick and the Innisfail district.

The Poultry Advisory Board.

In pursuance of the provisions of *The Poultry Industry Act of* 1946, the Governor in Council has approved of the constitution of the Poultry Advisory Board for the period from 14th November, 1946, to 31st December, 1947.

The members of the Board are: Hon. H. H. Collins, M.L.A., Minister for Agriculture and Stock (Chairman); Mr. P. Rumball, Officer in Charge, Poultry Branch, Department of Agriculture and Stock; Dr. M. White, Agricultural Chemist, Department of Agriculture and Stock; Mr. E. C. Knoblauch, representing growers supplying eggs to the Queensland Egg Board; Mr. C. Kidd, representative of the Poultry Farmers' Co-operative Society; Mr. D. Anderson, President of the N.U.P.B.A.; Mr. J. W. Bailes, President of the Poultry Farmers' Union.

The Navy Bean Board.

An Order in Council has been issued under *The Primary Producers' Organization and Marketing Acts* declaring that all navy beans the produce of the soil within any part of the State of Queensland and produced or to be produced for sale from 7th November, 1946, up to and including 6th November, 1949, are and shall be a commodity under and for the purposes of such Acts, and constituting the Navy Bean Marketing Board in relation to such commodity.

The growers' representatives on the Navy Bean Board are Messrs. H. Bird (Tingoora), A. Francis (Kumbia), T. Brewer (Mount Sturt), and M. P. Roche (Danderoo). These representatives, together with the Director of Marketing, Mr. H. S. Hunter, will hold office until 6th November, 1949.

Brisbane Milk Board.

The term of office of the present Brisbane Milk Board will expire on 31st January, 1947, and an election of members of the fourth board will be held at an early date. An Order in Council under *The Milk Supply Act of* 1938 provides that the number of representatives of producers on such Board shall be three, and the number of representatives of wholesale vendors, three also. Producers and wholesale vendors have been similarly represented on previous boards.

Sugar Levies.

Regulations under *The Primary Producers' Organization and Marketing Acts* have been approved empowering the Mourilyan Mill Suppliers' Committee to make a general levy for administrative purposes on suppliers to the Mourilyan Mill at the rate of 1½d. per ton of sugar-cane.

The Goondi Mill Suppliers' Committee is empowered to make a further general levy for administrative purposes on suppliers of sugar-cane to the Goondi Mill at the rate of ¼d. per ton, and the Innisfail District Executive may also make a further general levy on suppliers of sugar-cane to the Goondi, Mourilyan, and South Johnstone mills at the rate of ½d. per ton for administrative purposes.

Rural Topics

Market for Dairy Products Assured.

At a welcome home function accorded him by the Queensland Co-operative Dairy Companies' Association, Mr. Chris. Sheehy (Commonwealth Dairy Produce Controller), who with Mr. G. C. Howey represented Australia in recent negotiations between the United Kingdom Ministry of Food and the Commonwealth Government on prices and conditions to apply under the long-term contract for the sale of Australia's surplus dairy products, gave an absorbingly interesting account of his experiences abroad.

Australian dairy farmers, he said, could produce profitably for a few years because of the certain shortage of butterfat in world markets.

''Dairy farmers can go ahead with confidence and produce abundantly, knowing that they will be able to market their product,'' said Mr. Sheehy. ''In 1948, 1949, and possibly 1950, there will be a good world market for the whole of Australia's output of butter and cheese at reasonably satisfactory prices.''

Mr. Sheehy added that great advances had been made overseas in the improvement of breeds of dairy cattle, and in increasing the output of the dairy cow. In America it was expected that 600,000 cows would be bred by artificial insemination before long. Possibilities were limited only by the number of proven bulls available.

''In America also great strides have been made in the elimination of disease,'' Mr. Sheehy continued. ''Tuberculosis has been almost eliminated. The danger now is not so much the transmission from the cow to the human being, as from the human being to the cow.''

With the Australian Dairy Farmers' Federation president (Mr. Howey), Mr. Sheehy went through many American universities, saw most departmental Ministers, and was given full information.

''What struck us most was the tremendous size of the cows in many magnificent American herds,'' he said ''We were told these weighed between 1,500 lb. and 2,000 lb.

''At Madison University we saw a bull which turned the scales at 2,600 lb. The professor told us that Americans treated their herds as they would treat machines. Their policy seemed to be—the bigger the machine the bigger the output.''

Mr. Sheehy said that any sacrifice made in Australia to send food to Britain would be worth while. The Danish Agriculture Minister had emphasised the need for countries supplying Britain to get together now to stabilise the dairy produce market.

The association's president (Mr. T. F. Plunkett, M.L.A.), Hon. H. H. Collins (Minister for Agriculture and Stock), Mr. A. G. Muller, M.L.A., and representatives of many dairy producers' organisations and co-operative associations joined in the welcome to Mr. Sheehy.

A Farrer Memorial.

Near the civic centre of Queanbeyan (New South Wales) there is a bronze bust upon a pedestal backed by a pleasant bank of greenery. The inscription on the memorial dedicates it to ''William James Farrer, Australian World-Famed Wheat Breeder.'' Underneath is the quotation of his own remark: ''I want to think when the end comes that my life has not been wasted.''

At the base of the column there are bronze reliefs depicting farming scenes inset in the stone of the monument. Near Queanbeyan, in the Tharwa district of what is now Federal Capital Territory, William Farrer lived on a farm, ''Lambrigg,'' where he worked and died.

In his book, ''Canberra, Its History and Legends,'' the late John Gale, veteran Press chronicler of the Queanbeyan district, says that Farrer assisted him materially in his advocacy of Canberra as the Commonwealth Capital site. So appropriately, and almost prophetically, Farrer evolved his famous Federation wheat in what was to be Federal Capital Territory and so laid the foundation of Australia's great grain growing industry.

Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

HOW MUCH DOES YOUR CHILD WEIGH?

The majority of mothers nowadays have their babies weighed regularly in the first few months, but seem to think that the continuance of this practice is unnecessary once the child's first year has passed. This is a very wrong idea. The progress of a child's health is shown in his growth and weight, and a steadily increasing weight is one index of healthy growth. The human body may be likened to a bank where children can be taught to store up health instead of money. The gain in weight shows the child the amount on deposit in his "health bank." If the child is weighed regularly every month he becomes interested and thinks it fun to find out just how much he has put into his health savings account.

Mothers are used to following baby's weight chart, and it is just as easy to do the same for their toddlers—they should know that underweight in the older child may be a sign of over fatigue, loss of sleep, indigestion, or perhaps some emotional problem in his daily life.

Weight-for height tables are procurable, and an average is given in the booklet, "Care of Mother and Child." The rule which requires a child's weight to be within 10 per cent. of the average is based on careful study. It is the safest standard yet found, and is reasonably correct. If the child remains 10 per cent. or more *below* average weight for height, the cause should be investigated.

The same scales should be used for each weighing to avoid making a false record, as scales may vary. The child should also be weighed in the same clothing and at the same hour of the day each time, as there may be a difference of 1 or 2 lb. as a result of meals, sleep, or exercise.

The sister at your Welfare Centre will weight and measure your toddler regularly until he goes to school, but if you are too far away from a Centre, one of your local storekeepers may be able to help you with the weight, or you may, as supplies improve, be able to purchase a simple type of platform scale yourself—then mother and father can keep an eye on their weight also.

How to take the Height.—

(*a*) Nail two yard-sticks or tape measures end to end on the wall, extending from the floor upward, and leave them there.

(*b*) Stand the child in his stocking feet flat against the wall with the head, shoulders, buttocks, and heels touching the wall.

(*c*) Place a cigar box or similar small box over the head and hold it firmly against the measuring scale.

(*d*) Read the height in inches as shown where the bottom of the box meets the measuring scale.

A child's health cannot be measured by weight or height alone, but these must be taken into consideration with colour, firmness of muscles, posture, &c. Your family doctor or the doctor at your Toddlers' Health Centre will advise you whether your child has a big enough balance in his health bank. Next month we will talk a litle more about the child who is underweight.

Any further advice on this or any other matter can be obtained by communicating personally with the Maternal and Child Welfare Information Bureau, 184 St. Paul's Terrace, Brisbane, or by addressing letters. "Baby Clinic, Brisbane." These letters need not be stamped.

◆

IN THE FARM KITCHEN.

Rolled Oats Bread.

Two cups boiling water, ½ cup molasses (brown or white sugar), 2 teaspoons salt, 1 tablespoon butter, 1 yeast cake dissolved in ½ cup lukewarm water, 1 cup rolled oats, 5 cups enriched flour. Add boiling water to oats and let stand one hour; add molasses, salt, butter, dissolved yeast cake, and flour. Beat thoroughly, let rise, and beat again. Turn into buttered bread pans, let rise again and bake 50 to 60 minutes in a hot oven (375 to 425 deg. F.). If desired after the first rising, add 1 cup chopped nuts or prunes, cut in pieces, or use ½ cup chopped nuts and 1 cup prunes.

Moonshine Pudding.

Boil 1 cup water with ½ cup sugar. When boiling, stir in 1 tablespoon arrowroot, mixed to a cream with the strained juice of a large lemon. As soon as the mixture thickens take off fire, cool slightly, and blend well with stiffly-beaten whites of 2 eggs. Ready for use as soon as cool. Serve with custard sauce made with the 2 eggs yolks, 2 cups milk and 1 tablespoon cornflour. Stir together in a double boiler until mixture coats the spoon, cool, and add a dash of essence of lemon.

Wholemeal Sultana Loaf.

Four oz. plain flour, 6 oz. sultanas, ¼ teaspoon salt, 3 tablespoons brown sugar, 1 tablespoon butter, 4 oz. bran, 2 teaspoons baking powder, 1 egg, 1 small cup milk. Rub butter and sugar together. Add sifted dry ingredients, and rub butter and sugar mixture well into these. Add fruit and lastly egg beaten in the milk. Bake for one hour in round nut loaf tins (without lids) in a moderate oven.

Family Loaf.

When making bread, after the first rising, take some dough and into it work a handful of stoned raisins, a little candied peel, the juice of two oranges, a little sugar, two egg yolks, some butter (about a tablespoon) and some fresh dates. Work all this well in, grease a loaf tin, put the dough in, and set it to rise again. When risen bake, and when baked rub a little melted butter over the crust. This is a great favourite with children.

Dumplings with Boiled Meat.

Four oz. flour, ¼ teaspoon baking powder, 1½ oz. suet or cooking fat, a piece of chopped onion, 1 teaspoon chopped parsley, salt and pepper. Mix the fat with the flour and baking powder, rubbing it in if necessary. Add onion, parsley and seasoning, then sufficient water to form a light dough. Divide into 12 balls, flour each ball and add to the boiling liquid in which the meat is cooking. Simmer for 30 minutes.

Yorkshire Pudding.

Four oz. flour, 2 oz. mashed potato, 1 teaspoon baking powder, ¼ teaspoon salt, ½ pint milk or milk and water, 1 egg, 2 tablespoons dripping from the meat.

Mix the flour, mashed potato and salt together in a basin. Make a hollow in the centre of the flour and gradually mix in the egg and milk, keeping the batter free from lumps and beating until smooth. Stir in the remaining milk and add the baking powder last of all. Choose a rather shallow tin (a sandwich tin is excellent) in which to bake the pudding. Place 2 tablespoons of dripping from the joint in the tin and put in a hot oven for several minutes until the fat is smoking hot. Pour in the batter on top of the fat immediately and bake in the top of a hot oven (about 420 deg. F.) for 30-40 minutes, until well risen and golden brown. Cut in sections and serve. Remember, a hot oven, hot fat and a hot tin make a success when baking Yorkshire pudding.

QUEENSLAND WEATHER IN NOVEMBER.

Some local thunderstorms were reported in the Eastern Divisions of the State, 10th/11th, but the main unsettled period was between the 14th and 21st when late seasonal afternoon and evening thunderstorms benefited parts of the dry Central Highlands from Aramac north to Balfes Creek, and from Pine Hills east to the Central Coast between Byfield and Gladstone. The better served areas reported from 2 to 5 inches. Over average storms were registered in the Camooweal, Kamilaroi, Duchess triangle and along the Southern Border from Thallon to Stanthorpe. The only districts showing over average aggregate rains were Peninsula North (the results of a heavy rain at Thursday Island from a small cyclonic disturbance), the Central Coast West 204 points (average 161), and the South Coast Port Curtis 351 points (average 272). About normal rainfall figures were reported in the Central Highlands and Darling Downs East and West. Practically all inland areas west of the Downs continued under drought conditions, and the North Coast tropical areas showed deficiencies of 73 to 80 per cent. Cumulative storm benefits in the south-east between the Eastern Downs and the Coast should be consolidating the improved prospects in agricultural and pastoral industries. North from the Downs and through the Port Curtis and Central Coast areas storm distribution has been patchier and follow-up rains are still necessary in many areas, especially the Central Coast and North Coast Divisions (unusually dry since March). Apart from the scattered and temporary storm benefit during November in parts of the North-West and South Carpentaria, the months of October and November showed an almost complete failure of the usual patchy and variable seasonal distribution of local inland thunderstorms necessary to relieve the dry to drought conditions prevailing in so many districts west from the Maranoa to the Border and north to the Peninsula.

Pressure.—During the month there was an absence of any favourable inflow of warm tropical air to inland districts, and indefinite shallow gradient inland "lows" of the heat pool type commenced operations in the first week. Contraction to trough formation in Western Queensland on the 6th and 7th, and eastward movement with the associated cooler southerly front of the following "high" only brought local thunderstorms in the south-east of the State. Inland trough and southern low control became more in evidence on the 12th producing local thunder, and by the 17th the inland isobaric dip and an East Coast high pressure ridge were accompanied by a northerly wind circulation along the Central and South Coast of Queensland. This persistent formation, assisted by a moderate cold front from the inland "high," brought a series of afternoon and evening variable thunderstorms mainly in the South-Eastern Divisions till the 20th and 21st. The next two series of trough and high pressure movements produced no rain. A few showers on the far North Coast, 26th to 28th, accompanied moderate south-easterlies from the eastern "high." Between the 26th and 28th Thursday Island reported approximately 10 inches of rain (652 points on the 28th). This was the result of a small but apparently active cyclonic centre operating to the northward which ultimately filled in around its active area.

Local hail damage accompanied the thunderstorms and very extensive damage and losses (16th/17th) were reported in the Cleveland and adjacent farming districts. Quite a number of these local damage reports were received from many districts in the State. Heavy local blows in the dry and hot inland areas showed the usual tornadic characteristics.

Temperatures.—Maximum temperatures were mostly above normal, especially inland, ranging from 1.9 deg. at Longreach to 7.1 deg. at Mitchell. Greatest minimum departures also ranged from 2.4 deg. above at Thargomindah to 3.5 deg. at Longreach. The highest daily maximum reading of 109 deg. was reported at Cloncurry (30th), Camooweal (15th), Urandangie (12th/13th), Winton (12th), Longreach (12th), and Thargomindah (29th). Temperatures of over 100 deg. were reported on 21 days at Boulia and Windorah (9 consecutive), also Winton. Urandangie reported a minimum reading of 84 deg. (30th) and Windorah 80 deg. (30th).

Brisbane.—Mean Pressure $\frac{9+3}{2}$ 29.915 inches (normal 29.958). Temperatures.—Mean maximum 84.0 deg. (normal 82.3 deg.), warmest since 84.1 deg. in 1939. Mean minimum 66.5 deg. (normal 64.3 deg.), warmest since record 67.2 deg. in 1914 and second highest record. Mean temperature, 75.3 deg. (normal 73.3 deg.), warmest since 76.8 deg. in 1915. Highest daily temperature 94.4 deg. on 14th, lowest daily temperature 62.0 deg. on 1st. Rainfall.—84 points on 5 days (average 378 on 10 days). Sunshine.—Mean daily hourly 9.0 hours, highest since 1936, except 1945 (10 hours).

Division.	Normal Mean.	Mean Nov. 1946.	Departure from Normal.	Progressive Totals, May to end of November.	
				Normal.	1946.
	Points.	Points.	Per cent.	Points.	Points.
Peninsula North	199	276	39 above	514	478
Peninsula South	220	14	94 below	440	26
Lower Carpentaria	148	71	52 ,,	336	76
Upper Carpentaria	153	119	22 ,,	473	138
North Coast Barron	298	59	80 ,,	1256	497
North Coast Herbert	353	95	73 ,,	1751	442
Central Coast East	206	162	21 ,,	993	290
Central Coast West	161	204	27 above	634	222
Central Highlands	220	215	2 below	954	328
Central Lowlands	148	121	18 ,,	645	146
Upper Western	105	84	20 ,,	369	88
Lower Western	89	32	64 ,,	429	35
South Coast Port Curtis	272	351	29 above	1371	721
South Coast Moreton	357	141	61 below	1879	809
Darling Downs East	277	223	19 ,,	1318	827
Darling Downs West	232	205	12 ,,	1032	519
Maranoa	211	92	56 ,,	1023	265
Warrego	147	31	79 ,,	773	157
Far South-west	109	2	98 ,,	567	40

Commonwealth of Australia Meteorological Bureau, Brisbane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

NOVEMBER RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of years' records.	Nov., 1945.	Nov., 1946.		Nov.	No. of years' records.	Nov., 1945	Nov., 1946.
North Coast.	In.		In.	In.	*South Coast—cont'd.*	In.		In.	In.
Atherton	2·60	**42**	1·74	0·65	Gatton College	2·87	**44**	3·59	1·27
Cairns	3·81	**61**	3·38	1·18	Gayndah	2·97	**72**	1·70	2·93
Cardwell	4·14	**71**	3·07	1·93	Gympie	3·23	**73**	1·20	1·33
Cooktown	2·45	**67**	0·15	Nil	Kilkivan	2·66	**62**	0·85	0·99
Herberton	2·68	**57**	2·02	0·65	Maryborough	3·20	**72**	1·05	0·71
Ingham	3·75	**51**	1·69	0·44	Nambour	4·21	**47**	4·16	1·50
Innisfail	6·25	**62**	2·72	2·21	Nanango	2·86	**61**	2·98	2·55
Mossman	5·75	**19**	2·09	1·78	Rockhampton	2·48	**72**	2·28	2·89
Townsville	1·87	**72**	0·95	0·16	Woodford	3·29	**55**	4·00	1·75
Central Coast.					*Darling Downs.*				
Ayr	1·67	**56**	0·32	0·28	Dalby	2·80	**78**	3·93	1·48
Bowen	1·24	**72**	0·09	0·22	Emu Vale	2·81	**47**	1·68	1·60
Charters Towers	1·43	**61**	1·54	1·17	Jimbour	2·50	**64**	4·55	1·57
Mackay	2·05	**72**	1·63	0·53	Miles	2·58	**58**	3·91	2·45
Proserpine	2·82	**40**	1·14	0·76	Stanthorpe	2·76	**70**	1·37	3·24
St. Lawrence	2·40	**72**	1·67	1·40	Toowoomba	3·33	**71**	4·19	2·34
					Warwick	2·66	**78**	1·78	1·91
South Coast.									
Biggenden	2·90	**44**	1·86	2·08	*Maranoa.*				
Bundaberg	2·79	**60**	0·70	3·45	Roma	2·17	**69**	1·91	0·69
Brisbane Bureau	3·78	**94**	4·64	0·84	St. George	1·75	**62**	0·74	0·46
Caboolture	3·51	**67**	4·23	2·13					
Childers	2·81	**48**	0·94	3·19	*Central Highlands.*				
Crohamhurst	4·55	**50**	2·86		Clermont	2·15	**72**	0·61	1·93
Esk	3·25	**56**	4·19	0·93	Springsure	2·39	**74**	2·09	1·25

CLIMATOLOGICAL TABLE FOR NOVEMBER.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	86	70	89	30	66	1	118	5
Herberton	..	85	61	96	14	54	4	65	2
Townsville	..	88	73	92	20, 21	66	2	16	4
Rockhampton	29·95	94	66	101	16	61	1, 2, 21	289	6
Brisbane	29·96	84	67	94	14	62	1	84	5
Darling Downs.									
Dalby	..	93	62	99	28	52	6	148	2
Stanthorpe	..	83	53	96	26	43	6	324	6
Toowoomba	..	84	57	95	28	48	11	234	4
Mid-Interior.									
Georgetown	29·89	95	71	110	28	62	3	76	3
Longreach	29·90	99	71	109	12	61	21	56	4
Mitchell	29·88	96	55	104	29	48	1	77	4
Western.									
Burketown	..	95	74	104	15	66	20	Nil	..
Boulia	29·82	101	70	111	12	59	22	10	1
Thargomindah	29·83	98	69	109	29	54	1	4	1

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

JANUARY.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	4.56	6.46	Cairns	49	8	Longreach	43	27
6	5.00	6.47	Charleville.. ..	29	25	Quilpie	38	37
11	5.04	6.47	Cloncurry	63	36	Rockhampton ..	18	2
16	5.08	6.47	Cunnamulla ..	28	31	Roma	19	15
21	5.12	6.46	Dirranbandi ..	16	22	Townsville.. ..	40	9
26	5.16	6.45	Emerald	27	12	Winton	51	30
31	5.20	6.43	Hughenden ..	48	22	Warwick	3	5

TIMES OF MOONRISE AND MOONSET.

At Brisbane.

Date.	Rise.	Set.
	p.m.	a.m.
1	12.24	..
2	1.26	12.28
3	2.30	1.04
4	3.38	1.45
5	4.48	2.32
6	5.58	3.27
7	7.04	4.30
8	8.03	5.38
9	8.53	6.48
10	9.37	7.57
11	10.14	9.02
12	10.48	10.03
13	11.20	11.01
14	11.51	11.57
		p.m.
15	..	12.52
	a.m.	
16	12.23	1.46
17	12.57	2.40
18	1.33	3.34
19	2.14	4.29
20	2.58	5.21
21	3.47	6.10
22	4.40	6.56
23	5.35	7.38
24	6.32	8.16
25	7.28	8.51
26	8.24	9.24
27	9.21	9.56
28	10.18	10.29
29	11.16	11.03
	p m.	
30	12.18	11.40
31	1.22	..

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	18	21	34	38	9	12	38	43
6	10	29	26	44	0	19	28	52
11	15	24	31	40	7	15	35	46
16	24	14	40	29	15	4	46	33
21	30	10	45	25	20	0	53	28
26	23	16	39	31	14	7	45	36
31	13	27	28	42	3	18	31	50

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	26	34	48	54	33	39	22	29
3	15	39	41	57	26	42	15	33
5	7	48	36	62	21	48	8	40
7	5	53	35	66	20	51	6	44
9	11	49	38	63	23	49	11	41
11	20	40	44	57	29	42	18	34
13	30	29	51	50	35	35	25	25
15	41	18	57	43	42	28	34	17
17	45	10	61	38	45	23	37	11
19	51	4	65	34	49	20	42	6
21	54	4	67	34	51	20	44	6
23	51	8	65	36	49	22	42	9
25	43	17	59	43	44	27	36	17
27	33	27	53	48	38	33	28	23
29	22	38	46	56	30	41	20	33
31	12	47	39	62	24	47	12	39

Phases of the Moon.—Full Moon, January 7th, 2.47 p.m.; Last Quarter, January 14th, 12.56 p.m.; New Moon, January 22nd, 6.34 p.m.; First Quarter, January, 30th, 10.07 a.m.

On January 20th the sun will rise and set about 23 degrees south of true east and true west respectively, and on the 13th and 28th the moon will rise and set very close to true east and true west respectively.

On January 4th the earth will reach perihelion—the point in its orbit when it is nearest to the sun. There will then be 91½ million miles between the sun and earth.

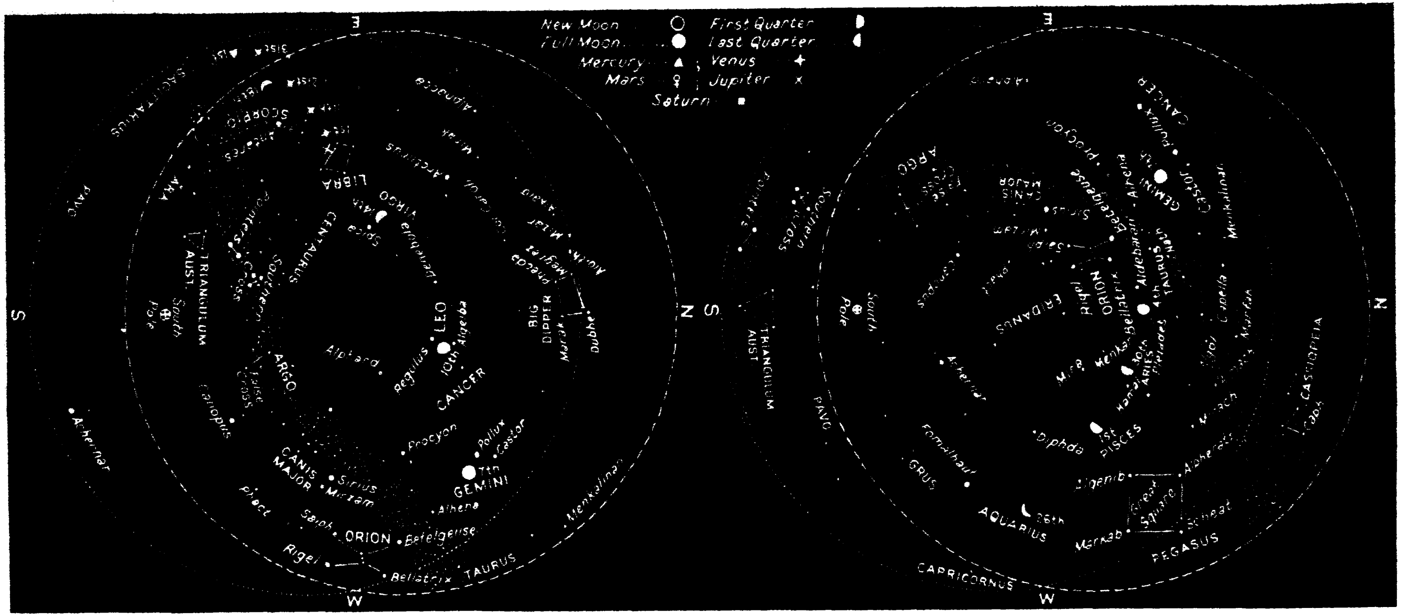
Mercury.—At the beginning of the month, in the constellation of Sagittarius, will rise about 1 hour before the sun. On the 23rd it will be in line with the sun, after which it will become an evening object, and on the 31st, in the constellation of Capricornus, will set about 25 minutes after the sun.

Venus.—On the 1st of January, in the constellation of Libra, will rise between 2.15 a.m. and 3.15 a.m., and the interval of its rising before sunrise will continue to increase until the 28th when it will reach its greatest angle west of the sun, it will then rise about 3¼ hours before sunrise. On the 31st it will rise between 1.55 a.m. and 3 a.m.

Mars.—Too close in line with the sun for observation, being directly in line with the sun on January 6th.

Jupiter.—At the beginning of the month, Jupiter and Venus will not be far apart, Jupiter, the fainter of the two, will then rise about 15 minutes before Venus. At the end of the month Jupiter will rise about midnight, nearly 2 hours before Venus.

Saturn.—In the constellation of Cancer and now almost in line with Castor and Pollux, at the beginning of the month will rise between 8.15 p.m. and 9.15 p.m., while at the end of the month it will rise just before sunset.



Star Charts.—The chart on the right is for 8.15 p.m. in the south-east corner of Queensland to 9.15 p.m. along the Northern Territory border on the 15th January. (For every degree of longitude we go west, time increases 4 minutes). The chart on the left is for 7 hours later. On each chart the dashed circle is the horizon as viewed from Cape York and the dotted circle is the horizon for places along the New South Wales border. When facing North hold "N" at the bottom; when facing south hold "S" at the bottom and similarly for the other directions. Only the brightest stars are included and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus, at the beginning of the month the stars will be in the positions shown about 1 hour later than the time stated for the 15th and at the end of the month about 1 hour earlier than that time. The positions of the moon and planets, which are continually changing in relation to the stars, are shown for certain marked days. When no date is marked the position is for the middle of the month.

NEPTUNE
ORCHARD SPRAYS
Oldest Established and Well Known
on Australian Market

Protect Your Investment
with

NEPTUNE RED SPRAYING OIL

Protect your trees against Red Spider and Scale Insects and tone them for the new season.

NEPTUNE PALSOL

Use for same purpose as Red Spraying Oil; may be combined with Lime Sulphur, Bordeaux.

NEPTUNE CLARIFOL

A dormant or semi-dormant Spray, use in combination with Lime Sulphur, Bordeaux or Black Leaf 40.

NEPTUNE WHITE SPRAYING OIL

For Citrus Fruits, Apples and Pears, Stone Fruit; either straight or in combination with Lead or Black Leaf 40.

Neptune Oil Co. Pty. Ltd.
(INCORPORATED IN NEW SOUTH WALES)

Branches in all States. Agents in all Fruit Growing Areas.

NS 451B

Indian Agricultural Research Institute (Pusa)
LIBRARY, NEW DELHI-110012

This book can be issued on or before ....

Return Date	Return Date